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THE THEORY OF KNOWLEDGE

THE
THEORY OF KNOWLEDGE

A CONTRIBUTION TO SOME PROBLEMS OF
LOGIC AND METAPHYSICS

BY
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OXFORD

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TO
S. H.

PREFACE

THE world of thought at the present day is in a somewhat anomalous condition. We have come to the point where science seems to stand in real danger of being ruined by her own success. The mass of accumulated fact on which she justly prides herself has become too vast for any single mind to master. There could be no Aristotle in the nineteenth century. Year by year it becomes more difficult to take any sort of view of the whole field of knowledge which should be at once comprehensive and accurate. It results that positive knowledge can scarcely be said any longer to have a general purpose or tendency. Intellectually, it is an age of detail.

The unity which we miss in science we might hope to find in philosophy. And here, indeed, our century has done its best. In Germany, in France, and in England it has produced great systems, containing elements of high permanent value. But these systems date from before the deluge of specialism. And they have all been, not so much refuted,—for a dialectical refutation can, after all, be lived down,—as undermined by the subsequent movement of thought and discovery. Nor is this all. Not only is there no accepted scientific system, but in England, at least, the tendency of philosophic work is scarcely sympathetic to science. So far from seeing our way to a near or distant synthesis, we are more distracted than ever when we turn from science to philosophy. Instead of uniting the sciences, philosophy threatens to become a separate and even a hostile doctrine. The antagonism is doubtless veiled, and the philosopher, like the theologian, is careful to avoid direct conflict with a far stronger foe. But the veil is not difficult to pierce.

The reaction against the scientific spirit, so characteristic of our generation, has shown itself in the philosophic world in the decay of what has been called the English school. Along with many defects and limitations, that school, from Bacon and Locke to Mill and Spencer, has had the merit of dealing, or attempting to deal, in a sympathetic spirit with the problems and methods of the sciences. The shortcomings of empiricism have been pointed out adequately enough now by the brilliant series of critics who have drawn their inspiration from other sources, and the danger at present seems to be that the real services of the English school should be forgotten. On the other hand, the newer movement in our thought, now itself nearly thirty years old, has hardly fulfilled its promise of giving us on metaphysical grounds a better synthesis than could be hoped for from science. As time has gone on, the purely negative and critical side of the movement has tended to gain the upper hand; and in the great metaphysical work of the keenest intellect which the school has produced, while everyone admits the force of the negative dialectics, such constructive conceptions as remain seem scarcely at home.

The net result is that in philosophy we tend towards negation. We get far enough to be sceptical about the foundations of science, and there we stop. In such a state of things the sinister interests in the commonwealth of knowledge see their chance. The popular essayist tells us that there is really nothing to speak of that we can know with certainty. One belief is on the whole as untrue as another, and therefore why not keep to that which is recommended to us by authority as best suited to our needs? An elegant scepticism about science takes the place of the elegant scepticism of theology with which our forefathers were familiar.

If we dismiss scepticism as a mere symptom of temporary intellectual paralysis, the task before philosophy, if full of difficulty, seems equally full of hope. In many directions ideas have been struck out, principles suggested, old barriers to clear thinking removed, and detail work accomplished in a thoroughgoing manner. The main difficulty is to blend the divergent currents of thought, and in particular the methods

of philosophy and science. For such a synthesis the first step needed is to break down the wall still maintained between the sphere of the systematised common sense which we call science and the world of ultimate reality. The contrast between the natural and supernatural, the shadow of which still lingers in the metaphysical contrast of phenomena and *noumena*, or appearance and reality, needs to be banished before we can even think of knowledge as a harmonious whole. But if science may claim to investigate the "really real," we need not suppose that its analytic method is the only process which can do so. The higher conceptions by which idealism has so firmly held are not to be "scientifically" treated in the sense of being explained away. What is genuinely highest, we have good reason to think, must also be truest, and we cannot permanently acquiesce in a way of thinking which would resolve it into what is lowest. The time would thus seem ripe for an unprejudiced attempt to fuse what is true and valuable in the older English tradition with the newer doctrines which have now become naturalised among us. In betaking ourselves to Lotze and Hegel, we need not forget what we have learnt from Mill and Spencer; and if we can hold the old and new together we may perhaps find ourselves on the way to the synthesis which we seek.

In trying to learn from sources so varied, I have incurred so many obligations that it is difficult for me to make special acknowledgments. But in view of the discredit into which his work is supposed to have fallen, I should like to lay especial stress on my obligations to Mill. Mill was guilty of shortcomings and inconsistencies, like other philosophers, but the head and front of his offending was that, unlike many other philosophers, he wrote intelligibly enough to be found out. But Mill is not the only writer who has made mistakes, nor is he the only writer who remains great in spite of them. Of course, I also owe much to the many writers whose names appear on the following pages mainly where I have ventured to differ from them. In this connection I wish particularly to acknowledge my great debt to my friend Mr. F. H. Bradley, whom I have been compelled to single out for criticism simply because his statement of views which I wish to combat is the

most powerful to be found. Mill and Mr. Bradley apart, perhaps I have learned most from Mr. Bosanquet's *Logic* and from the psychological work of Prof. James and Dr. Ward.

My special thanks are due to Prof. Alexander for carefully reading the proofs, and for many most valuable criticisms and suggestions, which are incorporated as far as possible in the text and are not further acknowledged.

One great difficulty in a work like the present is to find illustrations of logical method. Without special scientific training it is impossible to illustrate either adequately or accurately. I am conscious of great shortcomings on this head, but I have been greatly helped by Prof. Burdon Sanderson, who kindly read the chapters mainly concerned, and to whose suggestions I owe much. For the rest, I have collected illustrations as best I could from scientific textbooks, elementary or advanced. It has not seemed necessary to make any more special acknowledgment of this debt.

Lastly, I cannot close this list of obligations without expressing some gratitude for all that I learned from the private teaching of Prof. Case and Dr. Fowler, and from the lectures of Prof. Alexander and the late Mr. R. L. Nettleship.

L. T. HOBHOUSE.

OXFORD, Oct. 5, 1895.

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THE THEORY OF KNOWLEDGE

INTRODUCTION

PHILOSOPHY is a subject which everyone in the end defines for himself, and in view mainly of the particular philosophy which he himself has formed. We labour as philosophers under the peculiar and paradoxical difficulty, that we cannot properly state the questions which we are investigating until we are prepared with some kind of answer to them. Even if we could all agree on some abstract statement of the problem before us, and the methods available for solving it, the formulae used would probably mean very different things in the different mouths which should repeat them. Hence the Introduction to a work like the present must make no pretence to lay down the philosophical problem once for all as it must present itself to every inquirer. It describes the subject only as it has formed itself in the mind of the writer during the course of reflections explained in the following chapters, and it pretends to no value except that of serving in some degree as a guide in following the line of thought in those chapters. It explains, in a word, the rules of the game which the reader is invited to play. Whether the game is or is not worth playing, and whether it is better or worse than any other game which might be played by other rules, can be determined only by the final result. My business, then, in the present Introduction is not to decide whether there can or cannot be a theory of knowledge, or what subjects must or must not be treated under this head, but merely to explain to the reader what he is to expect in the coming chapters, leaving those chapters to justify themselves.

1. With regard to any statement we like to take, there seem to be three questions possible. We may ask what is meant; on what grounds is it stated; is it true? The first of

these we may call technically the question of meaning or content. If you make a statement you must, of course, state something, and this something is what your assertion contains—it is its content. The answer to the first question, then, consists in assigning the content of the statement, whether by mere repetition, or translation, or explanation, or in any other way.

The second question might be said to assume too much. Perhaps some statements have no grounds at all; and in a strict sense of the word this may be true. But every statement—even a lie—is motivated in some way or another. It is uttered for a purpose, or is brought about by some psychological cause, just like any other human act. And if for the present we do not discriminate between these processes by which a statement may be brought forth, we may assume that every statement has some grounds or other. And, in fact, it is our constant employment to examine the grounds of this statement or that.

This investigation is connected at once with the third question—whether the statement is true or false. Every statement falls into one or other of these two classes, while many appear, for our sins, to fall into both at once. But to have some degree of truth or falsity is the common characteristic of all statements, differentiating them from other forms of expression—prayers, commands, questions, aspirations, etc.

Now these three questions, which are asked by special inquiries with regard to this or that statement, or this or that class of statements, are asked by our branch of study with regard to statements, judgments, assertions, or whatever we please to call them, in general. The conditions, the content, and the validity of our knowledge as a whole, are the questions with which we have to deal. Each of them demands a word of explanation. I begin with the conditions of knowledge. In ordinary life we are content with a very little in the way of proof. If I am told that there will be an eclipse of the moon to-morrow night, I take the statement as sufficiently "proved" by a reference to Whitaker's *Almanack*. If I am studying astronomy, I take the question a little further, and endeavour to understand the mass of observations and calculations by which the eclipse is determined. But here again, though no longer content with the *ipse dixit* of Whitaker, there are a good many steps in the train of proof which I should probably take for granted, but which would repay some examination. The demonstration will assume, for example, certain geometrical theorems; and if we once begin to inquire into them and their grounds, we shall open up quite a new field of arguments, and perhaps of assumptions. It depends, once more, on the accuracy

and veracity of a number of observers, and perhaps on the make of their instruments; and here again points are suggested which might plunge us into a lengthy discussion. We may cut this short by remarking that in any proof, scientific or otherwise, we ordinarily offer such grounds as satisfy ourselves, and into the truth of these grounds we do not further inquire. And this is the right practical attitude. But it is just here that the theory of knowledge, for reasons of its own, takes up the question. It cross-examines the witness whom everybody else leaves alone. It endeavours to give as complete an account as possible of all the factors involved in the ground of any statement, leaving no assumption unexpressed, nor, if possible, untested. Briefly, then, on this head the theory of knowledge aims at completing the inquiry which every science makes into the proof of any given assertion. Every partial demonstration, we may say, makes assumptions, some avowed, others implied. The theory of knowledge endeavours to analyse the first sort, expose the second, and test both. While, lastly, its operations are, of course, not confined to any class of judgments, but should apply, ideally, to all our knowledge and belief. That is, it aims at giving the broad, fundamental conditions on which our knowledge and belief in general are founded; the application of these conditions belonging, of course, to special inquiries.

With the content of knowledge we deal in a still more limited sense. To discuss everything literally implied by the words would be to write a treatise *de omnibus rebus*. But logic has to trace the question, "What do we know?" so far as it is dependent on, or in turn illustrative of, the question, How we know? To take an instance, the question of the knowledge of an external material world—a question of what we know—was no sooner propounded than it raised in its deepest form the question how we know anything at all. It is obvious that any satisfactory theory of the conditions of knowledge must explain the knowledge that we have, and it follows that the main types of this knowledge must be analysed and understood before we know what we have to explain. If, however, the main divisions of our knowledge are made clear, and if it is seen that the conditions which we have assumed are sufficient to account for them, it will not be presumptuous to suppose that the detail of each division is to be explained by the play of the same conditions on different material. If we can explain, say, our knowledge of cause and effect in the abstract, there will be little difficulty in admitting that the same conditions in varying circumstances will give us our detailed knowledge of concrete effects and their causes. The question of the content of knowledge, then,

only enters into logic in a broad and general sense. We must endeavour to find the *summa genera* of reality, and show that the conditions which we postulate explain our knowledge of them all. The detail of the various genera will not trouble us further.

But at this point the question may be raised, whether all that claims to be knowledge is really such. It may be said that we are not bound to lay down such conditions as will explain every kind of "knowledge," for much that is called knowledge by the "ordinary" consciousness ceases to be such for the philosopher who analyses it. We have come, in fact, to our third question, which is logically anterior to that of the conditions of knowledge—the question, namely, of validity. Valid knowledge and illusion, however, have this much in common, that both of them consist of assertions, and the most illusory assertion is a fact to be explained just as much as the most scientific knowledge. Knowledge or correct assertion, moreover, is assertion made under certain differentiating conditions which it is the business of logic to discover; and hence we have, in fact, to deal with a wider genus of which "knowledge" is a part only. The conditions of assertion in general, and of good or true assertion in particular, are the subject of our treatise, but the greatest of these is true assertion. And we shall deal with assertion at large only so far as it will aid us in determining the conditions of true assertion, or knowledge. Understanding knowledge, then, in its strict sense in which truth or validity are included, we may say that our purpose is to examine the conditions and contents of knowledge in their broadest aspect.

2. The emphasis laid on validity is a characteristic which tends to distinguish the logical from the psychological treatment of the intellect. To psychology every mental state is of interest simply as a mental state; and if as psychologists we are investigating a belief, our main point would be to determine, not whether it is right or wrong, but how it came about, or of what mental stuff (so to say) it is made; whether it is allied to the volitional or emotional side of our nature, whether it is accompanied by a constriction of the small arteries or a tension of the muscles of the scalp, or a rise of blood pressure, how many thousandths of a second it takes to form, to what associations it will give rise, or any other question which the wit of man, or of an experimental psychologist, may suggest. But if we are logicians these questions are of value only if they suggest answers to the further questions—is this belief true or false; does it correspond to fact or not? In short, we have to deal with knowledge, that is, the relation of belief to fact; we

consider the mind "*non tantum in facultate propria sed quatenus copulatur cum rebus*." I do not wish to draw an academic distinction between logic and psychology. I mean for my own part to draw on psychological results whenever convenient. Distinctions between the sciences should, to quote Bacon again, be taken for lines and veins rather than for sections and separations. And the real meaning of the strong line of separation within which Metaphysics has so often tried to entrench herself is simply, it is to be feared, that she did not wish to be embarrassed by any awkward psychological or physical fact. Seriously, it is nonsense to speak of a thing being true for psychology but false for metaphysics. If truth is anything it is one and the same for every method of investigation, and the phrase can at best be but a manner of speaking. All I remark, then, is that logic and psychology have different centres of interest, and that I shall make no further excuse for failing at several points to follow up questions of great psychological importance. I make no attempt to draw a line of demarcation between the two sciences, nor should I expect much result from any attempt to do so.

3. The data of logic we have seen to be the mass of thoughts, judgments, or, as we shall call them generically, assertions, which we actually find made or entertained by men. To explain these is to exhibit the conditions under which they arise, and though logic, as we have seen, is mainly concerned with the conditions under which their truth is assured, the two sets of conditions must (if there is such a thing as truth at all) tend often to coincide, and in one respect the method of determining them is the same. For in any case, the most hopeful way of trying to explain a mass of data, is to proceed by the hypothetical method. Start at any point you like and consider the conditions which seem to be involved in the assertion considered. Then take these conditions and apply them in other cases. In this way you first test the alleged conditions, and see whether they are fundamental factors in knowledge or mere results of a particular collocation of circumstances. And then, supposing them genuine, you see how far they will go. If you find some assertion which they will not explain there must be some residual condition which you must determine. If, on the other hand, you arrive at any point at a set of conditions one or other or all of which appear to afford, in such general terms as you could reasonably expect, an explanation of any class of judgment which can be specified, then you would seem to have arrived at a true and even a complete account of the conditions of knowledge. I will give a simple and rough

example. Take the judgment, "I saw him when I was in London three years ago"; ask its ground, and you are told it is memory. Now about memory two questions may be asked. Is it, first, an ultimate fact or factor in our mental economy, or can it be in turn resolved into simpler elements, or explained on a psychological basis? And, secondly, taking memory for whatever it may be worth, how far will it carry us? This must be tested by a second judgment, such as, "I think you will find him a very objectionable person." Now, if we tried to explain this by memory too, the judgment would fall back into the less pretending one—"he certainly was so three years ago." But he may have changed, and so between these two judgments there is a gulf fixed which memory alone cannot bridge, and which forces us to a further postulate. Our method then will be hypothetical, and, for the rest, we shall try to justify the use we make of it in our concluding chapters, when, well or ill, its work is done.

4. The method in question labours under one peculiar danger or difficulty of which notice should be given at the outset. In using it we are bound to deal with abstractions, with the anatomy of thought rather than with the living whole. We have to take thought to pieces and exhibit it in fragments, each of which by itself is never a true living thought, but only some side or aspect or function of mental activity. In doing this we are only carrying the work of thought itself a step further. For the whole process of the mind in dealing with reality involves abstractions and separations which constantly tend to emasculate the truth. The mind, with all its powers, is incapable of grasping the whole even of the "flower in the crannied wall." It deals with it first under this aspect, and then under that—as a thing of beauty, as suggestive of a Wordsworthian sonnet, as injurious to the structure of the wall, as a *Composita*, as consisting mainly of carbon, oxygen, hydrogen, and nitrogen in certain proportions, as decomposing so many cubic feet of carbonic acid per diem under the influence of sunlight. And whichever aspect we like to take we are pretty sure to leave out the rest. The sonnet would be deranged by a thought of the carbonic acid. And yet somehow all these aspects belong to the flower. The whole, which is the real, contains or presents them all and many more. And so we learn our first lesson about thought, that to grasp anything at all we must leave out the greater part of it. We need not agree with Father Ogniben, that no man ever yet proclaimed a truth but he uttered twenty falsehoods to back it; but we must admit that the mind never yet sifted out a grain of truth without

letting twenty other grains slip past unnoticed. And here is the danger of all thought—that it takes the fraction of reality which it has secured for itself as the whole, or as significant of the whole. The first of these assumptions is a downright mistake; the second is dangerous, and justified only by special conditions. All the onesidedness, the narrowness, and, above all, the intolerance of the world comes from this inevitable abstraction of thought. And so the mind, though it must abstract, limit, ignore, is bound always to supplement its partial dealings; it must "strive always towards the whole," and if it cannot become the whole, it must try at least to understand its own limits.

Now, just as thought is abstract in its dealings with reality, so logic is abstract in its dealings with ordinary thought. Poor as thought is in comparison with the real, it is warm and living by the side of the bloodless (but necessary) formulæ of the logician. The reason is just the same as before. Thought tries to grasp what of reality it can, but cannot grasp much. So it takes hold of a part, a fragment, and grips it tight, and fixes it before the mind, and names it, and consigns it to its pigeon-hole. It does that over and over again, and by this piecemeal process, in which much is always omitted at each stage, but the defects at one point are supplemented or corrected by what is done at another, the mind painfully carries on its reconstruction of reality in a form in which it becomes intelligible at length as a whole. Now logic does just the same thing with thought. It takes it in bits and it misses out much at each step, but it puts in corrections as it goes on, and so in piecemeal fashion it tries to reconstruct the world of thought; ~~for you see~~

Thus logic uses words, clauses, sentences as symbols of thought. But any one of these taken in the isolated manner which logic can scarcely avoid is an abstraction, if not even a fiction. The word which is often thought of as representing an idea, clearly by itself represents nothing which can stand alone, unless it can be so much sound or so much ink. We shall have to notice this later, but I will point out here that even the sentence which is ordinarily supposed to stand for a complete thought is really an abstraction. You do not know what it really means unless you take it in its context. Everybody knows the use which can be made of quotations without their context; but if the question be pressed how much context ought to be given, it would be difficult often to draw the line short of the whole book, and even of the circumstances in which it is written. In many cases at least you can neither comprehend

nor do justice to a man's utterance on a single point without knowing a good deal of general history in addition to that of the man himself. Take this sentence: "It is death to souls to become water." Taken by itself this is mere talk, meaning nothing at all. Nor is it fully intelligible without a fairly exhaustive study of the fragments of Heraclitus in relation to all that we know of thought and science in the fifth and sixth centuries B.C. The doctrine then appears as the natural consequence of certain physical theories drawn with much acuteness and imagination from the somewhat scanty data at the disposal of an early Greek philosopher.¹

The single sentence is always more or less unintelligible when taken alone, i.e. apart not only from previous conversation but from the circumstances in which we are placed, the interest which we are understood to have in common, or the landscape which lies before us both. It is only an eccentric who, like "Mr. F's Aunt," plumps down remarks which bear no apparent relation to anything at all.

As with the sentence or the judgment, so with inference and all other processes of thought. We never assign the whole of the grounds on which we rest a result. What is more, we could not assign them if we tried. There are subtle indications, shreds and fibres of thought, complexities of relation in which each of our beliefs stands, which are all felt, which all have their effect, and which the most powerful and subtle mind could not unravel. No doubt one part of the advance of knowledge consists in becoming more explicit, so that we come to understand that which before we only knew; but this advance is very gradual, and perhaps its main effect hitherto has been to create some distrust of explicit reasoning as tending to half truths. We feel that there is more in our own reasonings than we ourselves know.

Our results, then, will at first be abstract in two ways. We shall have to take judgments and inferences more or less in isolation, that is, in abstraction from the other judgments and inferences with which they really stand in connection. And we shall have to deal with many functions or aspects of thought which may turn out, not to be real acts of thought at all, but rather to be involved as elements along with other elements in the structure of some real, concrete activity. In both cases we shall try to guard against errors which might arise from these limitations. It must be understood throughout that we are

¹ See Burnett's *Early Greek Philosophy* (chap. III.). The whole book affords repeated and admirable illustrations of the method of piecing together seemingly meaningless fragments into intelligible wholes.

dealing piecemeal with a single structure. Each fragment that we take implies other fragments, and ultimately, we may say, the whole, just as the human hand implies the arm, and ultimately the whole structure of the body. But just as for certain purposes the hand may be studied alone so for certain purposes, and with good results up to a certain point, we may take any fragment of thought's work by itself, though ultimately to understand it all we shall be forced on to other fragments, and so little by little to some account of the whole.

5. Supposing our difficulties overcome, the results to be arrived at in the present work could not in any case figure as a system of philosophy. It is of some importance, with a view to understanding the real aim and scope of the theory of knowledge, to make as clear as possible the part which it plays in philosophy as a whole. We must first, therefore, get some notion of what we, for our part, mean by philosophy. Philosophy, like any special science, is, or aims at becoming, a body of connected, systematic, reasoned truth. Now every science has its own appropriate subject-matter marked out more or less clearly from other things. Quantity, space, the general attributes of matter, the specific characters of different substances form the basis of mathematics, physics, and chemistry. But every science must, as we have seen, deal with abstractions, and limit its view to one side of reality. The aim of philosophy is ultimately to make good the deficiency by taking some view over reality at large. Reality as a whole is the subject of philosophy, and no fact is too poor or too remote to come within its range. This view is caricatured when the philosopher is taken to be a kind of Professor of Things-in-General. In reality, as Comte pointed out, he is as much a specialist as anybody else. No one claims for the philosopher that he can know physics like a physicist, and geometry like a mathematician. His speciality consists of the principles and results of other specialities, and it is enough for him—and difficulty enough too—if he can master these sufficiently for his purpose. The true philosophy, then, would be the synthesis of all that is known and, perhaps we should add, of much also that is only felt or hoped. Confining ourselves for the present to "what is known," it is clear that we should range ourselves with those who look on philosophy as essentially a synthesis of the sciences. Now, to this synthesis the theory of knowledge contributes only one element. It is not, that is to say, a theory of reality or a theory of all that is known. It is a theory only of the conditions of genuine knowledge and of certain broad aspects of the results or tendencies of knowledge which seem

to be bound up with any just conception of its conditions. Of course this is, in a way, a theory of reality;¹ and of course, in a way, any theory that professed to be a theory of anything, must claim to deal with reality. But by a theory of reality I should understand an attempt to deal with the real world as a whole, not merely with those elementary presuppositions as to its nature which seem to be involved in our knowing it at all.

Briefly, then, we have to do, not with the results of knowledge, but with the outline plan upon which these results may ultimately be pieced together. I may explain this by an analogy. Suppose we wished to construct a philosophy of everything that is visible—the material world, with its many-sided visible characters of colour, form, movement, and the like. Our complete account would include the results of many sciences; for we should have to take geometry and physics, and even biology into account, as dealing, all of them, with things seen. And our complete philosophy would set forth the systematised results of all these investigations. But among the sciences which would be pressed into the service is one not mentioned in the above list—that of physiological optics, the study of the structure and functions of the eye itself. And one thing which we should discover from this science is that the eye is far from being a perfectly correct optical instrument. Its deliverances, which we ordinarily trust with the most implicit confidence, are not always correct, as tested by consistency with one another, and the facts of touch. Now this might, if it went far enough, introduce an element of error into our whole theory of the visible. Through coloured glass everything looks red or blue, as the case may be; and so, if there is anything wrong with the organ of vision, who can tell where mistakes will end?

Now what physiological optics do for the eye the theory of knowledge attempts for the mind. Our common knowledge, and the special sciences, all, as we know, have a certain validity of their own. They claim our confidence as *practical* guides. If we govern our conduct by them we succeed in our purpose, and that in itself is a sufficient claim on our respect. To each science then *suus constat honos*. But when we come to judge of the world-whole by these fragments, the whole

¹ And accordingly I feel the less disturbed when I find the very possibility of a science of cognition denied by so high an authority as Mr. Bradley (*Appearance and Reality*, p. 76). I feel sure that the difference is rather in the method of stating or handling the question than in anything more vital. And accordingly I find that the problems treated by Mr. Bradley are very much those with which I myself have to deal.

question of their ultimate validity and significance revives in quite a new form. Do they give us ultimate reality, or do we live in a world of appearances? If our world is appearance, can we get ever at the real? If it is itself the real, is it *all* the real, or do we know enough of it to judge of the broad outlines of the real whole? These are the kind of questions we encounter, and these must be solved before the true synthesis of the sciences can begin. We must know the direction in which we are going, and something of the conditions of the journey, before we can travel with success. Or to vary the metaphor, the human equation must be determined before the results of science can be allowed finality. It is then this first stage of philosophy with which we shall be concerned in the following chapters. We shall deal first with the postulates of knowledge, and go on to consider its content and validity.



PART I



D A T A

CHAPTER I

SIMPLE APPREHENSION

"ALL knowledge," says Kant, "begins with experience"; and "all knowledge," says Locke, "comes from experience." Our first inquiry, then, must be, What is the simplest and most primitive form of experience? Where, if at all, is the ultimate datum to be found from which knowledge starts? Is there any fact or any state of mind which we can take as ultimate, which will help us to explain or justify other thoughts, but which needs for itself neither justification nor explanation?

Locke, we may remember, found such an unit of knowledge in his Simple Ideas. And these simple ideas were of two classes, those of Sensation and those of Reflection. If we inquire into the common character, uniting "ideas" of both kinds, we shall find it, not in their dependence on any sense organ, or on any special kind of physiological stimulus, but in their immediate presence to consciousness.

The phenomena of what Kant afterwards distinguished as the "inner" and the "outer" sense agree in this point. The headache which I feel, the blue outline which I see, the sweetmeat that I taste, are all, in some sense, facts immediately present to my consciousness, and the "plain man" would probably agree with Locke that no further proof could be given, or even reasonably demanded, for the existence of these facts, beyond this, that I feel, or see, or taste them. *Prima facie*, then, we are, as Locke held, from time to time aware of the present reality, and this "awareness" is a "primitive" act of knowledge. It depends on nothing but itself.

Is Locke's account true? or, abstracting from peculiarities of the theory of simple ideas, is there an act of knowledge concerned with present reality, and with that alone? If so, what logically and psychologically is its character? Is it "primitive," i.e. a self-evident foundation from which further knowledge starts, or is it in turn derivative? It will be the object of this chapter to answer these questions. Taking those

states of consciousness in which we have been supposed to apprehend present reality, we have to inquire into their character as mental states, and their value as elements of knowledge.

On the words "mental state" we must briefly repeat the caution given in the introductory chapter. The true mental state of the adult man is complex to the point of indefiniteness. We do not find apprehension succeeded by judgment, judgment by feeling, feeling by an act of will, and so on. If we did, our problem would be immensely simplified. But, in fact, every one of these terms represents an abstraction from the normal state of consciousness. Take what seems a purely intellectual state—a process of reasoning such as that by which we follow a geometrical demonstration. The actual consciousness of the reasoner is more or less absorbed in this subject, as the case may be. If he is an unwilling schoolboy, his wandering attention mingles ideas of escape and recreation with his geometrical constructions and syllogisms; and even the half of his attention which is devoted to the argument is coloured and qualified by the sense of effort with which he follows it. If he is a budding mathematician, his whole soul is concentrated on the work before him; but in this very concentration there is an effort and an interest involved which bring elements from the emotional and volitional side of his nature into play. Pure thought, pure will, pure feeling are not names of concrete mental states. This or that state may approximate more or less closely to the one type or the other; but how far this approximation may go, and whether it ever reaches completeness, it would be hard to say. The question is one for psychologists. All that we have to remark is, that when, for the purposes of our logical analysis, we speak of describing a mental state, such as a feeling or a judgment, we mean to describe, not any given state in its full individuality, but merely so far as it is a feeling or a judgment. That being understood, we may proceed to our first task—that of assigning the general characteristics of the mental state in which we apprehend present reality.

I. GENERAL CHARACTERISTICS OF APPREHENSION

1. The act which we have to discuss is perhaps more easily illustrated than described. It is, at anyrate, more easily described by negative than by positive attributes. To begin with, it is not a judgment. If, looking on the ground, I say, "this is grass," this assertion, simple and obvious to the point

of superfluity as it probably is, still takes me far beyond the region of present consciousness. It implies a comparison of the present with past sensations, without which this which I see would be an irregular surface of a particular shade of green, but would not be to me grass. To make use of the conception "grass" is to apply the result of many judgments and inferences. For "grass" undoubtedly means something which is not only coloured green, but has a certain "feel" and taste, and, moreover, exhibits certain uniform characteristics of life and growth. To all these there is an implicit if not an avowed reference in the apparently simple judgment of perception, "this is grass"; and, what is especially to be noticed, the judgment in question would fail to be true if the object before my eyes turned out, on investigation, to fail in any of the characteristics contained in the conception of grass. If, on my approach, it recedes or vanishes, it turns out not to be grass at all, but a mirage; and a quite different predicate is assigned to it. Summing up, the simple judgment, "this is X," is not the mere consciousness of what is present; it asserts characteristics or relations which are not present; and it may be true or false.

If we reduce the judgment of perception or Qualitative Judgment—to call it provisionally by that name—to the barest possible assertion that can still be called a judgment, the same truths hold of it. If its subject "this" refers only to the present, its predicate "that or the other" refers to something beyond. Accordingly it is susceptible, though in a diminishing degree, of truth and falsity. If for "this is grass" I substitute the more modest assertion, "this is green," I escape the risk of confutation by a mirage. Mirage or no mirage, I had a vision of green. "That's the four o'clock express" is more liable to be wrong than "that's a train"; and the poorer judgment, "that's a loud rushing noise," is safer still. But clip your predicate as you will, as long as you predicate something of the present, you make an assertion which goes beyond the present, and you are accordingly liable to error. This liability diminishes, as I say, rapidly; and practically, no doubt, in the simple judgments quoted above it disappears. Theoretically, it remains as long as the assertion goes beyond the present. This will be clearer when we have analysed the qualitative judgment. For the present, it may be enough to point out that it depends on the correct application of an idea to the present reality,—an operation which common experience shows may be often enough performed incorrectly, though to err in a simple case might be held to argue imbecility.

I conclude, then, that if we wish to arrive at the mental condition in which we are entirely occupied with the immediately present, and with nothing else, we must go further back than the simplest form of judgment, if by judgment we are to mean an act of thought expressible in words. The simple judgment, whether in the set form, "here is X," or in the loose interjectional form, "Fire!" "Freezing!" is a further reaction of the mind supervening on the consciousness of what is present, and using the content of that consciousness as part of the material for its own assertion. The actual consciousness of the present goes before the judgment.

But now it will be asked—If we go behind the judgment, what do we come to? To the apprehension of the present.¹ But is not this merely feeling or sensation under another name? And is it not written that feeling and knowledge are for ever distinct? For example, to take one statement out of an infinity, in Prof. A. Seth's admirable *Scottish Philosophy*, p. 87, we read: "The philosophical point is the complete or generic distinction between Perception and Sensation,—between Knowledge and Feeling,—which for ever precludes any derivation of the one from the other. On this distinction Reid is prepared to stake the whole question between himself and the ideal scepticism. It is the same issue by which Kant also chooses to abide."

As against this we would maintain, that if by feeling Prof. Seth means our consciousness of the present, this consciousness is itself an act of knowledge. It possesses the two essential features of such an act—if at this early stage we may speak provisionally of essentials. It is the act of a conscious subject, and it has an object or content. The first position can only be denied by questioning the existence of the subject; and that question, if raised at all, must apply all along the line, to the highest judgment as to the simplest sensation. The second point can hardly be denied without altering the meaning of the terms used. The object or content of a thought or judgment is that with which in that thought or judgment the mind deals, or is occupied, which it has before

¹ I use the term Apprehension for the state or act of mind known sometimes as sensation, sometimes as perception, sometimes as immediate consciousness. If I owe the reader an apology for introducing a new usage, my excuse must be that each of the terms in use conveys a meaning which I am anxious to avoid. Apprehension has certainly a wider meaning than the technical one which I wish to give it, but this wider meaning is so general that no confusion can result from it. I may say that I shall frequently use perception, sensation, and consciousness as variants for apprehension when no confusion can result from so doing, and when the use of either term seems specially appropriate.

it. None of these phrases are explanations; they are simply different ways of putting the matter. Of the fact itself, that in any act of knowledge the mind has some content before it, there is neither explanation nor proof. Now, as in judgment, so in apprehension, the mind has an object or a content; only whereas in a judgment the object may be anything from the building of Aladdin's palace to the prospects of the next general election, in apprehension it is always the immediately present, the warmth of the fire, or the blue of the sky. Now this, I shall be told, is obvious in a sense; but the whole question is (a) whether in these cases it is the present *merely* that is before me, and (b) whether some activity other than that of mere passive apprehension is not involved in the matter. These questions I shall deal with presently. For the moment I wish merely to recognise, or rather to insist, that if the present is to be known to us as such at all, the apprehension of it must be regarded as an act of knowledge; in short, as an assertion.¹

2. Assuming for the moment that we do apprehend the present, we must admit that apprehension to be a kind of assertion.² Now, of this kind of assertion, we are able to say generically several things, two of which should be noted here. Thus (a) every apprehension involves a measure of attention, varying from zero to a maximum. (b) Broadly, the *clearness* of the content present varies with the attention, increasing as we concentrate attention on it, diminishing as our minds are attracted to something else.

(a) The psychological facts here are well known, and are verifiable by anyone for himself. We all know the difference between a concentrated and a distracted attention, and we also know (b) that if we wish to see or hear clearly, we must concentrate attention as far as possible.

We are not in apprehension left to the mercy of the physical stimulus applied. Other things equal, the same stimulus produces a content of the same clearness; but then

¹ As a matter of words, "feeling" may mean, not the "act" of consciousness, but its object. We have then to insist that it is an object of knowledge. See on the same point Dr. Ward (*Ency. Brit.*, art. "Psychology," 9th ed. p. 41), who shows the error of arguing from the "subjectivity" of sensation as a state of mind to the denial that sensation is an object presented to mind.

² Objection may be taken to the use of the term Assertion in this connection. I may explain that I use it here and elsewhere as a general expression for every act of knowledge (whatever its nature or source, whether it be sensation or thought, vital for every act of belief, whether it be true or untrue. All these acts have a certain character in common, and to express this character we want some single word. I employ the word assertion as more free than any other from special associations from which I wish to be clear.

other things are not always equal. A strong stimulus—it does not matter here whether we are speaking of the physiological change or of the mental state on its first appearance—will, on an average of instances, produce clearer contents for apprehension than a weak stimulus. But if the weak stimulus is “interesting,” it drives the strong one out of the field by arousing the activity above named. The loud, even roar of the torrent down in the valley passes almost unnoticed as I write, while the first sound of a cock-crow at once arrests attention, because that particular noise happens to exasperate me. In general—possibly in the last analysis in all cases—the power of arresting attention depends, not on the inherent character of an object, but on its connections; on the ideas, hopes and fears, anger or gratitude, that it raises. But this is a psychological question. All we have to notice is that attention once roused disturbs the balance of clearness and dimness. Alert and swift, it seizes on one of the many details present, drags it forward into clear light, and examines it to the bottom. It promotes and degrades, without reference to the original strength of stimulus. It brings a dim, far-off voice or the distant colour of a well-known dress into the very focus of apprehension, and all else is relegated to the dim, indefinite background of consciousness, from which the object of interest stands out.¹

A very small degree of introspection carries us a step further. Actual consciousness never is wholly definite. Concentrate as you will on the point before you, you are always vaguely conscious of its surroundings. According to Wundt’s famous simile,² the apprehending consciousness is like the eye. Whether we see, hear, or feel, there is a point of clear consciousness, a point rather of clearly-defined content on which consciousness is concentrated, while around and about this point are dimmer, vaguer forms, which shade away gradually into the dark. Indefiniteness is not an accident of consciousness; it is a constant element in its character.

Now, looking to the logical nature of the act, we must

¹ It is usual to say that attention makes the object “clear”; but on this point we must follow Mr. Shand’s distinction between the clearness attaching to the object as its own character, and the clearness which is really synonymous with the fact of being attended to. You may attend to a dim light and note that it is dim, or to a confused medley of sights or sounds and remark that it is a confused medley. So far what is obscure before attention remains obscure to attention. But it is also clear, as being now definitely before the mind (see “An Analysis of Attention,” by A. F. Shand, *Mind*, N. S. No. 12; and of *infra*, chap. iii. p. 64.). The connection of attention and clearness is therefore a degree more complex than would appear from the text.

² *Grundzüge der Physiologischen Psychologie*, vol. ii. p. 236 (3rd ed. 1887).

regard apprehension as aware, not of the definite only, but of the indefinite as well. The whole that is present to me at any moment is the content of my apprehension for that moment. As I write, the words before me and the movements of my pen occupy the forefront (in Wundt's simile, the *Blitzpunkt*) of consciousness; but along with them goes the plashing of the fountain below my window, and farther off the rattling of a waggon on the road, while the mass of organic sensations and bodily pressures form a dim, uncertain background, which is there and yet not there, affecting consciousness and yet hardly apprehended as such. With some of the logical difficulties which suggest themselves here we will deal later. At present we point out only that we are in some way aware of the whole that is present, and that, therefore, apprehension cannot be identified with any particular degree of attention. To deny this would be to introduce a feeling which is neither an act of knowledge nor a content for knowledge. If (which, of course, we have yet to prove) the present is anything at all for us, we must have knowledge of it, and that knowledge we have called apprehension. But the same reasoning must apply to every element of the present. Whatever is such an element must be so for our apprehension.

It follows that theories of the nature of attention as a psychic activity do not affect our present position. We may as psychologists hold, with Wundt, that a special form of mental activity, acting in accordance with laws of its own, picks out this or that object that comes within the field of consciousness and brings it into clear light. Or we may retort, with Münsterberg, that the whole process of attention¹ can be explained by the same psycho-physical laws as are postulated by every change in the content presented. We are not, fortunately for us, called upon to enter this contest. The logical result alone affects us. There is a definite content recognised when attention is concentrated, and an indefinite when or in so far as it is distracted. The mechanism by which attention is concentrated or distracted, whether it be psychic or physiological, special or general, does not touch this result.

This point is worth noting, in view of a possible misinterpretation. In describing present consciousness as an assertion, I might be understood as inventing an unreal

¹ It is better, I think, to translate "*Apperception*" by this term than to import the word into English, more especially as *Apperception* itself, not to speak of its meaning in Leibnitz and Kant, is used by the Herbertians in a different sense.

separation between the act of consciousness and its content. This is far from my intention. I do not mean that we have first the content rising before consciousness on its own account, and then a reaction on the part of the mind recognising that content. This would really be the precise opposite of the position I am maintaining. It would involve us once more in an unapprehended, unperceived, and therefore unknown state of mind. We *may* (if Wundt's theory be correct) have an object first apprehended, and then by a separate act attended to. We cannot have a content first in consciousness and then apprehended. To be in consciousness and to be apprehended are the same things. We do not, in short, attempt at this stage to define the relation of consciousness to its object. All we say is, that whatever our immediate consciousness may be, it is not merely an affection of the mind in this way or that, but an assertion of this or that, a cognitive act. That is one of its characters, whatever the rest may be. On our first question, then, of the general nature and characteristics of immediate consciousness, I conclude that such consciousness has the general character, shared by all knowledge, of being an assertion; that it is an assertion of the present; and that it is to be distinguished from any judgment naming or describing the present, since such a judgment includes in its content something that is not present.

II. THE PRIMITIVE CHARACTER OF APPREHENSION

3. I have now to show that the apprehension of the present is, in the world of knowledge, a primitive act and an ultimate fact. Of course it has conditions of its own; but if we were asked to name them in the present state of our knowledge, we could only suggest some physical or physiological antecedents of a somewhat hazy character. With these conditions we have nothing to do in the present chapter. But there are quite other conditions alleged, without which, it is said, our apprehension of the present could not be; either it could not exist at all, or at least it could not be genuine knowledge. The apprehended content is "made what it is," "determined," "constituted," by the synthetic or correlative activity of thought. This view, as is well known, appears in sundry forms and in divers writers. To give an instance, here is one among a multitude of Professor Green's accounts of the matter—

"The so-called 'immediate intuition' only has any content just so far as it is not merely presentative. Just as when, in

view of Locke's doctrine, that that only is 'real existence' which can be known in 'actual present sensation,' we ask how much of any supposed real object is reducible to 'actual present sensation,' we find that the object disappears, so is it when we ask how much of an object of intuition remains after abstraction of all that belongs to it as representative. 'This book' is an object of intuition, but all qualities in virtue of which I recognise the object as a book depend on its relations to objects not now presented in intuition at all, of which relations, therefore, the knowledge is representative, not presentative. In the absence of these, nothing remains as merely presented but the 'here' and 'there,' 'now' and 'then,' 'this' or 'that', and can even the 'this' and 'that' be said to be merely presented?"¹ Briefly, if we "exclude from what we have considered real all qualities constituted by relation, we find that none are left."²

Abstract from the presented book all its qualities, and nothing remains. That is clear enough. These qualities depend on, or are constituted by, relations to non-presented qualities or objects. Here we must distinguish. The existence of the given qualities depends causally on something past, no doubt. But that is not what we are told. We are told that the present qualities are *constituted* by relations, and that the knowledge of them depends on these relations. Take the first statement. How does a relation *constitute* a quality? "The book has a brown cover," i.e. the cover is related by way of resemblance to other brown surfaces, and by way of difference to any other colour we like to take. But does the relation *constitute* the brown, or do the browns and other colours constitute the relations? It is quite certain that if this book had not the colour which resembles other brown surfaces, it would not itself be brown. It is equally certain that if it were not that which I apprehend, it would not resemble other brown surfaces. The colour present to me resembles other colours; but this does not prove that to apprehend it is to apprehend that resemblance, and therefore a relation. On the contrary, the fact here present is not a relation, and never becomes a relation. In the development of knowledge it may become a *correlate* of countless other terms, the meeting-point of innumerable relations; it is never itself a relation.³ Is it,

¹ *Works*, vol. ii. p. 168.

² *Prolegomena to Ethics*, p. 23.

³ This Green himself admits. "No feeling, as such or as felt, is a relation" (*Proleg.* p. 39). This is well enough. But when we read a few lines lower down of the idealism which interprets facts as relations, we ask in despair, Is feeling a fact or not? Do we never really feel at all?

then, a correlate? Certainly; but it is not given as such to simple apprehension, in the case before us. What I apprehend is the colour, and not the relation of the colour to something else. No relation to anything outside an apprehended content can be an element in that apprehended content. What, then, is the given? I am asked. A quality. What quality? The colour brown. Why, then, I shall be told, you have admitted our whole point. You say you apprehend the content apart from its relations, and when you are asked to say *what* you have apprehended, the very first term you use is the name of a general quality which instantly expresses hosts of relations in which the object stands. Undoubtedly, in using the general term "brown" I have described the fact through its relations, but I have come to mention its relations precisely because I am now describing and not apprehending. I am no longer apprehending the fact present to me, but describing to you what I have apprehended. Description undoubtedly is by general attributes, and therefore by relations. But as undoubtedly description is *of* the already apprehended fact. To apprehend the fact is one thing, to describe it another, and therefore there is no reason to assign to apprehension that assertion of general attributes without which description cannot begin. Apprehension, in fact, is of contents which turn out to resemble other contents, i.e. present general qualities, or stand in relation to other facts,—put it as you please. To describe what you have apprehended is to state in words these general qualities or relations. The descriptive judgment, that is to say, is a further mental act of which apprehension is the basis. It is precisely the act which judges some quality of the apprehended fact to be general, i.e. to resemble qualities of other facts. Now name such a quality, call it X, and say, if that content which I apprehended just now had not possessed the quality X, it would have been simply nothing at all. All that is perfectly plain; but it is quite another thing to argue that, therefore, I apprehended the content as X, i.e. as a general quality, and therefore I did not really apprehend it at all, but made a judgment in which the non-presented instances of X were involved or implied. That judgment I did make when I described my apprehension. It was what I added by my description to the datum of apprehension which went before.¹ It was not the apprehension itself.

¹ It is, no doubt, involved in this view that (apart from the case of command or request, which do not here concern us) speech is the expression only of a judgment or the results of a judgment. So far Green might seem justified in the remark (Introduction to Hume, p. 36) that "a consistent sensationalism

The statement that the content apprehended is constituted by relation to other contents, might mean one of two things. It might mean, first, that the content, actually asserted by the mind is always in the cases considered some relation between the present fact and some non-present fact; i.e. that to be aware of my present feeling, is to judge its relations. In that case I would ask how we know what the "it" is whose relations we judge. A relation involves terms related. How do I know those terms? How can I judge the relation of a feeling to something else, unless I have knowledge of the feeling itself? How can I tell that the rose in your hand is sweet, unless I can see the rose and smell the scent? Once more, though the exclamation "toothache again!" is very closely bound up with a given feeling, yet the feeling is not the judgment of the relation between this toothache and yesterday's. The feeling is not the judgment, the judgment is about the feeling.

But, secondly, if a relation is not actually asserted whenever we apprehend a fact, it may be urged that the theory we are combating does not intend this, but merely holds that the fact apprehended is meaningless except as the term of a relation. But this is ambiguous. If it means that a fact except as related is indescribable, it is true; but it is a truth that concerns description, not apprehension. If it means that any given content must, in fact, stand in relation to others, that the given A must be at least comparable to some B or C, this is again true. But it does not follow that in apprehending A, I apprehend its relation to B or C. There is no unrelated particular. Every fact is a centre of relations, but I do not know that by merely apprehending the fact itself. If, lastly, you mean that as an unrelated content—a content whose relations are unknown—a fact could be nothing for me, you say that which your own qualitative judgment contradicts when it says this is hot, meaning the fact apprehended. For if the apprehended were nothing for me, how could I logically

must be speechless." But this would hold only if knowledge consisted entirely of sensation, not if knowledge while based on sensation includes judgment about sensation. Such a judgment is the act of naming. The naming is a judgment (i.e. if you prefer it, the verbal expression of a judgment); that which you name is (in the cases considered) the content of a sensation, or, as I should call it, an apprehension. Green's remark *op. cit.* p. 18., that the individual sensation is "unnamable, because while we name it, it has become another," involves a confusion. In naming the sensation's content our total mental state has passed from one of pure sensation (if, for the sake of argument, we grant the possibility of such a condition) to a state in which sensation and judgment are blended. But the sensation itself as either as a mental event over, or it remains a pure sensation. It does not pass into judgment. We pass from apprehending it into judgment about it.

assign it a predicate? You may urge that the apprehension cannot logically or psychologically go before the simple judgment because the "manifold must collapse into unity" before it can be matter of knowledge. Then how, in that case, did you know that it was a manifold?¹ If you did not often enough apprehend the manifold as a manifold and pigeon-hole it by a distinct act, you would be quite sure that knowledge began in pigeon-holes and not in chaos. As it is, you talk of the chaos in one breath, and in the next deny yourself any possibility of knowing it. No doubt in ordinary adult life we do not go through a psychological process beginning with apprehension and passing on to a qualitative judgment. The two acts are merged in one concrete, mental state. But even this can hardly be proved in all cases. Whenever we are placed in unusual circumstances necessitating close attention to strange things, the qualitative judgment becomes consciously a reflective attempt to analyse what is given. If I try to follow, for instance, the changing shapes of an amoeba, I concentrate all my efforts on the object seen on the slide, and then with another conscious effort grope about for qualities or relations which will describe its successive figures and vague, clumsy motions. Still more clearly the "stunning" effect of a crash and a flash delays the process of attention, arrests judgment, stops one's power of "taking in," i.e. judging, what has happened. In such cases the act of apprehension stands out clear and defined, separated from the other activities which normally accompany it, or rather are so fused with it as to form one mental state.²

And whether or not there is this *de facto* separateness, the qualitative judgment implies the independent validity of the act of apprehension. Without it the subject of the judgment would be an unknown thing. This might have seemed clear enough from the form of the judgment, "*this is X.*" But Green detects a relation involved even in the word "*this*"; for instance, in lines following the passage I have

¹ Green expressly tells us (Hume, *loc. cit.*) that the sensation is "unknowable, the very negation of knowability." Then how could he possibly be in a position to tell us two lines above that it is "fleeting, momentary, unnameable"? Surely we have learnt from Green's own masterly criticism of the Thing-in-itself doctrine that the unknowable is also the meaningless, and that even to postulate it (as, for example, Professor Seth speaks of postulating sensation, *Soc. Phil.* p. 89) is to involve ourselves in a purely gratuitous contradiction.

² I.e. we get something like a "pure" state of apprehension. But, as above stated, it is difficult to say whether we ever have it completely pure. Probably ideas begin to rise on the outskirts of consciousness while the present content occupies the centre. But we have it pure enough to mark the distinction of the two acts.

quoted above, p. 23. "Does not 'this' always indicate a relation of something to, and distinction of it from, a subject conscious of itself as not beginning or ceasing with the presentation of 'this,' through the medium of which again the present something is related to, and distinguished from, other 'somethings' ? But neither the identity of the ego nor the past somethings to which, through common relation to the ego, the present is related, can properly be said to be presented."¹ It is significant that the relation alleged to be involved is here changed. It is no longer a relation directly to other things, but a relation of the presented fact to self, and to other things through self, which we are told the word "this" implies. Observe; my contention is that the qualitative judgment represents in words the attempt to bring the present into relation with other things. The predicate then (including the copula) should give the relation, the subject should state the reference to the present. Now we find that Green himself does not contend for a direct reference to other things in the subject. Directly there is only a reference to self; so far as direct reference to other things is concerned, the qualitative judgment on Green's showing bears the required witness on my side. But the reference to self is open to the same criticism as the alleged reference to other things was before. In saying "this" I do not consciously assert a distinction between myself and what is present to me. Such a distinction becomes obvious later on, when other activities are brought into play; but we want to isolate a particular activity and find out what it gives us taken by itself, and the way to get at this is not by confusing its report with that of a crowd of further acts of the mind.²

It would be better, in the interest of Green's contention, to do away with this last subtlety and urge simply and straightforwardly that the "this" of the judgment implies a distinction (and hence a relation) between the given content and others. This distinction is sometimes the explicit purport of the demonstrative (e.g. 'this book, not that, is the one which I want'), and might be taken as ordinarily implied. But then, again, it must be remembered that the use of the general term

¹ Works, loc. cit.

² On the doctrine "that a thought, in order to know a thing at all, must expressly distinguish between the thing and its own self," Professor James remarks. "This is a perfectly wanton assumption, and not the faintest shadow of reason exists for supposing it true. As well might I contend that I cannot dream without dreaming that I dream, swear without swearing that I swear, deny without denying that I deny, as maintain that I cannot know without knowing that I know."

"this" to designate the subject belongs to the proposition, and accordingly represents a part of the act of judgment; that act which, according to our contention, exists in order to bring the immediately known present into relations (whether of distinction or connection) with other facts. And granting that the "this" expresses a correlation, what does it correlate? What meaning has it if not a reference to the present fact, distinguished, if you please, from other facts. But if the fact is not there, what can there be to distinguish?¹ Its mere distinctness from B does not constitute A. Nor in apprehending A itself do I apprehend its distinctness from B. A is distinct from B as I find out when I consider them both together, and I then know that if it were not so I could not have apprehended A alone. But apprehending A alone is not in itself the same thing as apprehending A + B.²

The judgment dealing with the present "this" is absurd and self-contradictory, if there is no "this" present to me. I must be aware of the present in order to make judgments about it. This awareness must be either an element in the judgment itself, or a state of consciousness antecedent to the judgment. And here we may make a concession. If all that is intended by Green's criticism is that, psychologically considered, apprehension is an element in judgment (or some more complex mental state) and not a state of mind complete in itself, we can afford to leave the question open for logic. Psychologically, we believe that there is evidence (as urged above) that apprehension of the present sometimes exhausts the whole field of consciousness. But we are only concerned with logical factors in knowledge and logical distinctions, and on that ground we maintain that apprehension is a distinct factor, postulated as a condition by judgments of perception, and that its content is a distinct part within the more complex whole which judgment

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¹ "The idea of this would be falsely used, unless what it marks were actually presented" (Bradley, *Logic*, p. 66).

² "It cannot be said that we have the idea of red as red only when we distinguish it from blue or sweet, and only by so distinguishing it. . . . There could be no conceivable occasion for attempting such a distinction, nor any possibility of succeeding in the attempt, unless there were first a clear consciousness of what each of the two opposites is in itself" (Lotze, *Logic*, Eng. trans. bk. i. chap. i. sec. 11). In the following sentence the same doctrine is implicitly applied to sensations or impressions.

On the significance and implications of words like "this" or "here," we shall have more to say when we come to the judgment. They vary, of course, according to the context. Our only contention at present is that the main purpose of the words in the simplest qualitative judgment is to indicate the present as such. The distinction they involve is a mere means to this reference.

4. Then, is the apprehension of the present entirely undetermined by antecedent experience and by thought of such experience? Not certainly in all cases. When, after staring at a bright red object, I turn my eyes upon a white sheet of paper and watch the dim green after-image rise, the content now before me is determined by the antecedent experience. So in all the manifold cases falling under what is loosely termed Weber's law; so in all cases of colour contrast, and no doubt in many other instances. In all these cases the past experience actually contributes to modify or even create the present by acting on the condition of the sense-organ or the brain. Here experience determines the present sensation, but not the thought of past experience. However, thought also may be said to contribute to determining the content of sensation, for instance, whenever practical interests determine the direction of attention, or when knowledge of the real character of an object enables me to see in it what I could not distinguish before I knew what to look for. The latter case will be familiar to anyone who has used a microscope under the guidance of another person, or who has looked at a distant object in the company of someone more familiar with it than himself.¹

But it is only by a confusion that instances of this kind can be imported into the present discussion. Consider the issue. We have been contending that the content of apprehension is a primary datum for knowledge; that is, that we may take it as fact without implying an assertion of any other fact, or postulating the existence of any activity except that of apprehension itself. Against both these contentions it was urged that either a whole or a part of the content claimed for apprehension was, in fact, the work of thought. This argument we have met on general grounds and dismissed. Now certain cases are alleged in which an undoubted thought modifies the content given. But nothing is alleged to show that any element in the content given could only exist for thought or only be known by thought—that it is, in short, a thought-product and not a sensible fact. Thought is shown in these cases to be one among the antecedent conditions determining sensation, but neither thought nor any thought-product is proved to be an element constituting the whole present to sense. A factor in the cause is mixed up with an element in the effect, an antecedent condition with a constituent element.

¹ See Mr. Romanquet's interesting paper on "An Essential Distinction in the Theories of Experience" in the forthcoming "Proceedings of the Aristotelian Society" (1895). I refer, by kind permission, to a proof in my possession.

Apprehension as an occurrence in consciousness always has its conditions, and these broadly may be divided into two sets, the physical stimuli acting upon the sense-organ, and the condition of the organ, or rather of the whole organism, at the moment. Any alteration in either of these factors may modify the resulting state of consciousness. But none of these conditions enters into the sensation which results from them. To perceive a flash of light is not to be conscious of a wave of molecular change in the optic nerve; the antecedent condition of the sensation is not an element in the sensation itself. Now among the conditions of sensation one of the most important is the state of attention at the time—a state which has, no doubt, its mental and its physiological side. Preparation helps out the stimulus, fills up gaps which would be left in the sensation if the same stimulus acted on an unprepared mind; or defines what, without it, would be given as a vague blur. And thought acts by putting attention on the stretch—i.e. by preparation. Whenever it does this, thought is a part cause of apprehension. But the fact apprehended under these conditions is no whit the less given to apprehension than any other. It is for apprehension its own present self, and not its relation to other things; and in apprehending it we are directly aware of it as fact.

Thought, then, never constitutes the apprehended content as such;¹ but it is sometimes an antecedent condition of apprehension, without which the apprehension would not be precisely what it is. It acts indirectly by modifying attention, and the nature, extent, and frequency of its action is purely a question for psychology. There seem to be abnormal cases (as in hysteria), where it may be the main or even the sole determinant of the sensible change. But that it is an universally necessary condition of our apprehending anything there is no evidence whatever. Normally its result is to modify the effects of the physical stimulus, chiefly in point of clearness or intensity. And all our reasonings on the subject presuppose

¹ It is often urged that some perception is constituted by thought because the actual data are not adequate to the reality which we claim to perceive. Take an extreme case. "I observe" the structure of a protozoous under the microscope by means, in effect, of a complex series of inferences. And this inferential process can be traced in all perception. But here there is simply another confusion between apprehension and judgment. What I see is really such and such an outline, colour, change of size, shape, or what not. By comparison with one another, helped by what I know of the structure of the microscop, I interpret these as meaning much more than I actually see. But I am loosely said to see what I only infer. In this case what is ordinarily called perception is a judgment involving true inference from the given, and it must be distinguished from the case in the text where preparation actually modifies the perceived datum.

the independence of sensation; since, first, the effects of attention can only be proved by a deflection of the conscious state from that effect of the stimulus which we take to be due to the stimulus as such; and, secondly, we can only allege the interference of thought when past experience can be assigned to supply thought with its material, and this supposes that the thought acting on this sensation is itself based on past sensation. Apprehension, therefore, does not postulate any activity of thought as its necessary condition, nor does thought contribute any element to its content. The contrary view, in fact, is but one of the many forms of confusion between sensation and stimulus. The stimulus is taken as being the sensation. Then it is shown that we apprehend more than the stimulus itself, or perhaps something quite different to the stimulus itself. And this difference is set down to the account of thought. The simple fact is that we do not necessarily apprehend the stimulus at all. The stimulus is the cause of apprehension, and need by no means be the fact apprehended. And the same holds of the circumstances, mental or physiological, which modify the effects of the stimuli. They are causes antecedent to apprehension, not themselves apprehended, nor yet activities of thought operating on what is apprehended.¹

To sum up. Thought relations never constitute a content of immediate apprehension. Such contents do stand in manifold relations which are unfolded by judgments about them; but the apprehension of them is not the thought of their relations, nor does it depend for its existence in consciousness upon these relations. The judgments themselves would have no meaning if they did not refer to the data as apprehended. Apprehension, therefore, does not depend on any hitherto assigned mental activities.²

¹ On the actual determination of one sense datum by another, a sort of secondary form of relativism, has been formulated by certain writers, such as Mill, H. J. Ling, Wundt, and Professor Bain. This theory has been sufficiently refuted by Dr. Ward (op. cit. p. 49) and Professor James (*Principles*, chap. ix.). It is enough to remark here that the facts of colour contrast, etc., do not begin to disprove the validity of apprehension. The white of this paper is to me sense-percept on white, though if I lay it on snow it becomes dirty white. All this proves is as before, that the stimuli received by my retina from rays reflecting from this paper do not wholly determine the resultant sensation. Other simultaneous or antecedent stimuli contribute to the result. But in any case the sensation is what it is, and is known for what it is, and all we can say, as Professor James says, "that the same real thing may give us quite different sensations when the conditions alter, and that we must therefore be careful not to select as the thing's truest representative." But the consideration of this question belongs to quite another department of logic.

² It depends, of course, on a capacity for apprehension, just as eating depends on a capacity for digestion, but we are not much advanced by considerations of this kind.

III. THE CONTENT OF APPREHENSION IS FACT.

5. If this has not already been admitted on all hands, it is rather because thinkers have doubted the existence of apprehension than that they have recognised it and denied its validity. By almost universal consent we are in closest contact with reality in sensation, or in other forms of immediate consciousness, all of which I include under the term Apprehension. Those who deny any other knowledge of reality have taken our judgments to refer to what we did or shall, or under certain circumstances should, perceive. And if we do not allow, with Berkeley, that of all the objects of perception the *esse* is *percipi*, we may convert the phrase and say, that for all matters of immediate apprehension the *percipi* is *esse*. And thus far, perhaps, we may go with Berkeley, that whatever *else* we may mean when we say that this or that exists, we at least mean that we did or shall, or under appropriate circumstances should, apprehend it; while, conversely, the content, being once apprehended, is *co ipso facto* without further question.¹

To be finally convinced of this it is only necessary, I imagine, to remove certain confusions and misconceptions.

¹ Hegel (*Phänomenologie des Geistes* A. i. pp. 73 ff.) has tried to show that immediate consciousness or apprehension contradicts itself. It takes its object as simple and immediate, i.e. it is the "this," and that means again the "now" and the "here." But what is the "now"? It is, e.g., night. But then again it is day: it contradicts itself. We might answer, the "now" which is day and the "now" which is night are different "nows." It is not "the now" (*das Jetzt*), but "now" of which we say that it is night; and one "now" is not another "now." Hegel would reply that he provides for this by saying that the truth is that the "now" is universal, including all sorts of "nows." This is, of course, true enough, but, by the same reasoning, its universality consists merely in "now-ness," i.e. presence, and this is compatible with any amount of difference in the content of each several "now." The validity of the particular momentary content is therefore unaffected. Lower down, after remarking that the "contradiction" in the content of the "here" and "now" as object (*Gegenstand*) drives us back into our subjective apprehension of them, and that this also is general since the "I" is so, Hegel finds the reality in the totality of the consciousness and its objects, the whole sense-certainty itself. But of this sense-certainty we must become aware, and while we do so it ceases to be present. It no longer has existence (*sein*), it is just (*sein Gewesenes*, p. 78). This shows, of course, what we have already admitted, that you cannot describe or know *about* the present fact without a judgment, and for argument's sake we may suppose the judgment necessarily to follow apprehension in time. If my mind were confined to the present, it could never know that it was so, still less communicate it. But because I can know more than the present, it does not follow that I know less. I know the present by one act, and know that I know it by another. The second act may not be immediate, and its object may be past, but if so that object is just this—that a moment ago I was conscious of the then present object. I cannot therefore think that Hegel has shaken the validity of immediate consciousness, or shown that its object is other than the individual present fact as such.

Take the case, which occurs at once, of an illusion. "That's a man in the corner of the room—no, it is a shadow." Clearly this is an error, as above explained, of comparison and inference. But it may be objected, the figure of a man was actually before my consciousness. Or take a clearer instance: We cannot help seeing the new moon bigger than the old one "in its arms," though we know that the outlines are segments of the same circumference. Surely this is an error of vision, not of judgment? Of vision, yes. Of apprehension, no. The error is due to retinal "irradiation," not primarily to any intellectual process; therefore it is quite correct to call it an error of vision. But if we make strict enquiry, and ask where error begins, the answer is, not till you form some such judgment as, "that irregular outline is the present shape of the moon." This judgment is false: the apprehension, on the contrary, is merely an assertion of what is present to you, and the irregular light and dark shape is present to you. The assertion that it is the moon says a great deal more about it than you see. It says that the content with which attention is now occupied is a part of the surface of a distant body, etc. It is in the predicates thus assigned to the content that error consists. And thus, I venture to say, will be found to be universally the case. Confine yourself to the assertion of a fact before you, and there is no error. Make comparisons and draw inferences, explicitly or implicitly, and error comes in.

But the very act of attention itself sometimes brings about an illusion, for example, an imaginary pain. Is such a pain real? Undoubtedly, if we mean by pain strictly the mental condition of the moment. The rheumatism of an amputated leg is as much pain to the sufferer as the burn on his sound arm. When we say it is not real, we mean it is not really rheumatism, i.e. a bodily affection existing in the place where it is supposed to exist. Similarly a hysterical pain exists "nowhere" as a bodily affection, or if we ask for its seat as a physical derangement, we shall look for it in the centre rather than the periphery of the nervous system. But it again is every whit as much pain to the subject. Once for all, if by pain is meant a mental feeling, a "malade imaginaire" may really suffer as much as his heart could wish, and the hypnotic patient who is not aware of any pain when his teeth are drawn really has none.

It will further illustrate my meaning if I point out that this doctrine in no way conflicts with the difficulty, widely recognised in psychology, of accurately observing one's present condition. Prof. James, following Mill and Wundt, has at

once insisted on this difficulty, and explained it.¹ It is often very difficult to observe one's present mental state. How can that be if the present content is always fact, and nothing but fact? Easily enough, considering that observation for scientific purposes means fixing, retention, naming, classifying. All that passes through the swift mind is for the moment somewhat; but what?—i.e. what name has it, in what class does it fall, in what precise order did it come? Before these questions are well asked, still more before the ideas requisite for the comparisons are alive in the memory, the present facts have hurried past, jostled and crowded away from the focus of consciousness. They are already past, and the question is not for apprehension, what they are, but for memory, what they were. Even supposing the naming or comparing to be done for the object while present, the comparison itself involves memory, and is not therefore infallible. Apprehension is for ever giving us fact, and taking it away again, and hence it is that for steady and certain knowledge we want so much more than apprehension. Thus the familiar question, "Is this real?" does not ask whether that which I apprehend is fact, but whether it is something else besides itself—whether something further is true of it than that which I apprehend. "Is this a dagger which I see before me?" means not, is there really the appearance in question, but, will that which I see stab? If I clutch at it, will it resist my touch, be hard, sharp, smooth, heavy, stab my guest? That which appears is as it appears real, but are these judgments which I am at once inclined to make about it true or false? Does it stand in relations which I suppose for it as soon as ever I apprehend it? The error comes in in the assertion of these relations. And this assertion is no part of the content of apprehension. But according to the relations in which it stands, one and the same given content has indefinitely different meanings, belongs, as we ordinarily say, to totally different "orders of reality." In which of two sets of relations a fact stands, what are its concomitants, its conditions, its results, what, in short, are the other facts with which its

¹ See especially his *Psychology* ii. pp. 189 ff. As I understand Professor James, the above account is substantially his: the judgment, "this is cold," is certainly a different state from the feeling cold. I only do not understand him when he says broadly: "No subjective state, whilst present, is its own object, its object is always something else." Surely a feeling is its own object, what other object has it? Professor James could, I think, only object to this if he adopted Wundt's theory of apperception, which I do not understand him to do. Then, indeed, every act of attention would have "something else" for its object. But I imagine that Professor James really is thinking of the judgment, which must always have some other content as its object, a fact which is sufficient to prove his general position.

existence is bound up, are questions which we must answer if we are to *understand* the fact; and how we answer them makes all the difference in the world to its significance. But the answer comes not from apprehension, but from judgment; and though by the answer it gives the kind of reality to which the fact is attributed may be altered, the fact itself *as apprehended*, if we confine ourselves strictly to what is apprehended, is never altered and never unreal.¹

A further comparison will illustrate the necessary correctness of apprehension. In an ordinary judgment—one of memory, for instance—the content asserted gives its quality to the assertion. Now the assertion, "I met you here last spring," may be true or false, but if we put it, "Well, I certainly have the distinct remembrance of meeting you," then—apart, of course, from the case where from "intent to deceive" the words do not correspond to our actual mental condition—the truth of the judgment cannot be contested. And the explanation we usually give is, "My memory no doubt has deceived me, but I certainly have the recollection," etc. This is precisely parallel to the optical illusion, "My eyes perhaps deceive me, but I certainly see that man pass two solid iron hoops into one another." Quite so. I do *see* it; I do remember it. If for the memory-judgment I substitute the assertion of what is at present in my consciousness, viz. the idea of a certain content in a certain position in past time, then there is no getting rid of the reality of that idea. If, that is, I substitute for the memory-judgment proper, which is an assertion of something absent, the apprehension of the content of the memory judgment as an idea or belief at present in my mind, then my judgment is infallibly true. I am asserting that which is, in fact, qualifying my present consciousness. So with all apprehension. Its content is true, because what is present to consciousness exists as a quality of, or element in, that consciousness, if in no other relation; and apprehension as such does not decide in which kind of relation the fact exists. As soon as we do decide we are judging, and at the same moment we become liable to error.

6. I conclude, then, that the consciousness in which we are directly or immediately aware of the content present to us, a state which I venture to call apprehension, is a primitive or undervived act of knowledge. Apprehension has the general characteristics of awareness, or assertion, shared by all the

¹ The interpretation of the question, "In this real?" as "In what relation does it stand?" has never been better expressed or defined than by Green, *Prolegomena*, bk. i. chap. 1.

intellectual actions which constitute knowledge; there is, however, no logical¹ reason to analyse it into an act of attention or apperception on the one side, and of sensation or feeling on the other. It is further "primitive" in the sense that with it knowledge begins, that its existence postulates no further knowledge, or mental activity of any kind, as its antecedent condition. The content of apprehension is Fact, and the basis of our use of the term fact, and on this account we shall find that apprehension is the primitive datum of knowledge in a more ultimate sense, for to it we have to refer questions of validity, and—whatever may be the antecedent conditions of an act of apprehension—its deliverance is always an ultimate and final court of appeal which no consideration of anterior conditions can upset. The fact apprehended, then, is not only the beginning of knowledge, but is also the ultimate—or at least, let me say, one ultimate—source from which our judgments of valid truths are derived.

Lastly, to remind ourselves here of a remark already made, we do not contend that apprehension is ordinarily found bare by itself, stripped of all other kinds of mental activity. Hence in speaking of it as the primitive mental act, we are not intending to give an adequate description of concrete acts of the mind in its early stages. What precisely may be the character of the mind in infancy must be discovered, if it is at all discoverable, from the observation of infants, and not from the analysis of adult knowledge. For our purpose it is indifferent whether an act of apprehension ever exists by itself in the sense of forming the whole state of consciousness for the time being. We are contending merely that such an activity is to be found on analysis in many of our mental states; that it is a condition of knowledge; and that by itself it takes us a certain distance and no further. It is useful for our purpose to find cases where this activity is actually in the concrete isolated from others, such as the qualitative judgment, with whose operation it is easily confused. But its separateness as a condition of knowledge from other conditions depends, not on distinction of time, but on distinction of function. We are fully prepared to admit, therefore, that the apprehension of the present is not normally a separate activity of the mind in the sense of exhausting all that the mind is at a given moment. Possibly it is never so. Our actual state of consciousness at any moment is, as a rule, very complex, involving the apprehension of many different objects by more than one sense, together with judgments, inferences, and the like. Nor would it be:

¹ I mean as distinct from a psychological reason.

true to say that the apprehension of any one fact A always, as a psychological event, goes before the judgment that asserts that it is A. All we contend is that analysing that section of our mental state for the moment which is concerned with the judgment, this is A, one subsection will be found to consist of the apprehension of the given, and another of the assertion of its character or relations. In carrying out this analysis we do what every science does. By analysing concrete phenomena, we endeavour to isolate certain conditions—which may never exist in isolation—and obtain their results taken by themselves. Gravity does not exist apart from other qualities of body, but we can disentangle it as a condition of motion, and accurately measure its effects taken by themselves. Similarly the problem of logic is to disentangle the conditions of assertions,—conditions rarely found operating in isolation,—and to determine what portion of the asserted content it is for which each condition is severally responsible.

CHAPTER II

THE CONTENT OF APPREHENSION

1. FOR examples of sensation, our thoughts turn naturally to the simple qualities of things—cold, sweet, blue, loud, and so on. When questions of its function in knowledge have arisen, the tendency has been to identify sensation with these qualities. And this done, the further question at once followed—how about the relations in which these qualities stand? what of their coexistence and succession, their resemblance and difference, their order in space, and so forth? And keeping to the idea of sensation as giving these simple sense-qualities and nothing else, two courses became open, one adopted by thoroughgoing sensationalists of “explaining” relations as due to some composition of sense-qualities, the other resorted to by Reid, and with a more penetrating analysis by Kant, of attributing the relational element, so to call it, to another activity of the mind different from its mere power of receiving impressions, to “spontaneity” instead of “receptivity.”

The Kantian view is a rigorous deduction from its premises. *If* sense gives us qualities in which no element of relation is present, it is quite certain that no mental chemistry can build up relations out of qualities. If we immediately perceive colours that have no extension and no order in space, sounds that have no duration and no order in time, then it is clear that no combination of such colours will begin to give us space, and no cluster of such sounds would bring about the perception of time. It would remain to separate the “given” quality and the “order” which the mind constructs for itself. If, therefore, there is an answer to Kant, it must be found in a revised conception of the “given” element in knowledge.

Now here we find the greater part of the work already done for us, and that in large measure by Kant’s descendants. It has been pointed out now often enough by successive writers that the simple quality supposed to be the primitive datum

for consciousness is, in fact, an abstraction. Who ever saw a colour that was not spread over a certain space, or heard a sound that did not last an appreciable time, or even felt a pain that he did not vaguely locate somewhere? There may or may not be more primitive elements to be discovered by analysis in these data of sensation; but if so, they are not themselves data of sensation as they stand. There is no sensation but has extent in time or in space, or in both; and if this be questioned in the interests of sensationalism, we can only retort upon the objector the famous demand of his philosophical father, "I desire it be produced."

To deal, first, with such relations as resemblance and difference, I have shown above that apprehension has nothing to do with the assertion of relations between the present and the absent. But there are relations of this kind between the elements of the present itself. Looking at two peas or two oranges, their resemblance is a matter of immediate apprehension. Looking at the lines on the page before me, their distance apart, their directions, their parallelism are similarly present to my consciousness. Two cautions are needed here. First, we do not mean that the act of apprehension is equivalent to the judgment, "These peas are alike," "these lines are parallel." This judgment, expressing itself in general language, involves the subsumption of the given under a general idea, and this subsumption is not the work of apprehension. But the judgment, as we have seen above, aims at expressing that which I apprehend; the present likeness, the present parallelism, being apprehended form the basis of the judgment. Secondly, the likeness and the parallelism are abstract terms; but we do not apprehend the likeness or the parallelism as abstract facts, that is to say, in separation from their context. We apprehend the whole fact—two peas, two straight lines. The resemblance of the peas is a characteristic, an abstract characteristic, if we regard it by itself, of the two peas considered together. But in apprehending, we do not regard it by itself. We apprehend the whole content with all its characteristics, of which the resemblance in question is one. The knowledge of this resemblance, then, does not as such involve any addition to what is given in apprehension, nor a knowledge of anything apart from the case in which it is given; it involves simply the consciousness of this among the rest of the manifold characteristics of the given.

To deny this, it must be first argued that we cannot apprehend two peas or two straight lines together, and that if we wish to know their resemblance, we must first attend to one

pea, then to the second, and then "construct," or in some other way arrive at, the relation between them. But why stop at one pea? If you deny that we can in one and the same moment of time be aware of two small round coloured objects, why should you find it easy to be aware of one such object? Each pea consists of parts in space, and has very many different characteristics. How is it that we can apprehend such a complex object all in one moment? Clearly the argument once seriously faced reduces our knowledge literally to atoms. There must be some original dot of colour or what not that forms the primitive sensation. Of the theorist who contends for this, we can only say with Herodotus, that he escapes confutation by carrying his tale to the region of the invisible. A sensation of this kind is not verifiable by consciousness. If it exists, we are not aware of it, and we do not for our part desire to go beyond what we can observe. But if we are guided by observation, we shall admit that two peas are as readily apprehended as one—nay, we shall have to allow that if they lie close together, it is impossible to observe and difficult to attend to one of them alone. In fact, the contents from time to time present to us are normally complex, not simple.

It may be asked, if you admit complexity, where do you put the limit? If you apprehend two peas, why not twenty; and if twenty, why not a million? My reply is, that I do not find that I can apprehend a million objects of any kind at once. I do find that I can apprehend two peas at once. Then how many can I apprehend at once? This I cannot tell precisely by simple introspection. I am quite sure that I can apprehend two, and equally sure that I cannot apprehend a thousand as distinct objects. But between the two there is a point at which my attempt to analyse and class my mental state becomes confused, memory beginning to help out apprehension. But is not this fatal to the whole theory? Apprehension must have definite limits, and surely it must know what its own limits are. Not at all. Apprehension is a form of assertion which I come to know by attending to and analysing my own consciousness in relation to its objects. The apprehension of A B is not itself the consciousness that I apprehend A B. This consciousness is a *new* mental state, having the former state as its object, and may be a much more difficult state to arrive at. In point of fact, apprehension of a series of objects, A B C D, passes continuously into memory. At any given point it either is apprehension or memory, and when it is the one it is not the other. But which it is at any

point is a question to be answered, not merely by having the mental state, but by analysing, naming, and classifying it—a very different matter. We have all sorts of mental states without always being able to analyse them aright. The difficulty is not peculiar to apprehension. And experience has shown that introspection in such cases must be helped out by experiment. By simple self-observation we can only get such crude results as I have already mentioned. We can be quite sure that two peas can be presented simultaneously as distinct objects, and that a hundred cannot be. But if we wish to get a more definite conception of the matter, we must use experiment, i.e. observe our perceptions under special and artificially determined conditions. Thus Mr. Cattell found that he could distinguish from four to five disconnected objects (such as letters, figures, or lines) under conditions which eliminated the possibility of successive acts of apprehension. If, however, the elements were so connected as to form together some known content, he could apprehend about three times that number.¹ Less exact experiments tending to the same result are quoted from Hamilton and Jevons by Prof. James,² who also mentions M. Paulhan's observations on the power of attending to distinct mental operations such as the recitation of verses carried on simultaneously with a process of multiplication. The time-results here indicate that the attention can be successfully distributed between the two objects at once. In all these cases it must be remembered that the separate objects are clearly distinguished, and therefore occupy the focus of attention. The whole field of consciousness must be, as Wundt argues, considerably larger. But confining ourselves to clear consciousness, we find that we can apprehend four or five disconnected objects simultaneously, and from twelve to fifteen if they form part of a whole.³ But even this is not all. The simple objects, the single lines, and *a fortiori* the single letters of Cattell's experiments, are themselves already complex facts in which an upper and lower, a curve or a straight line, can be distinguished. Hence, unless we are prepared to produce the sensational atom out of which these objects which we know are constructed, we must allow these complex contents to be the ultimate data of knowledge. The

¹ Wundt, *Grundzüge*, chap. xv. § 3.

² *Op. cit.* i. pp. 406, 407.

³ Prof. James says that within any one "system" (by which he means what I have called a whole), "the parts may be numberless"; but then, as he rightly adds, we attend to them "collectively." For me the question is, How many connected parts can be known distinctly as parts? and the best answer here available is Cattell's—from twelve to fifteen. On the further extension of apprehension, we shall speak presently in connection with duration.

simplest sensations verifiable by experience allow themselves on analysis to be resolved into related elements.¹ There is no reason whatever to suppose that the elements and the relations are given by different processes. If we apprehend the one, we apprehend the other; if, *e.g.*, apprehension distinguishes an A from a B, an M from a W, it must distinguish the relations of the lines composing these letters. The contents of apprehension are therefore wholes consisting of related elements, and the elementary relations of things are given, just as much as the elementary qualities of things. The whole difficulty on the point has arisen from the dogma that the original data of knowledge are simple in character. This dogma appears to have rested on a confusion. It was held, and I shall presently argue, correctly held, that the mind could not invent or construct any simple characteristic of things, or, to put it better, could only form fresh contents of thought out of elements already given it. The simple characteristic thus became an ultimate datum for knowledge. Then it was, I think, unconsciously argued, knowledge must begin with these simplest elements; they must be given in their simplicity. Not at all. All the first position proves is that the simple elements must all have been given or presented to the mind. *How* presented it does not say. Now our argument admits of their being given, but points out that they are given, not in isolation, but always, to use a well-known expression, "in some context which is individual and peculiar."

From the alleged simplicity of the data of knowledge arose half the difficulties of sensationalism. By it also was occasioned Kant's answer to the sensationalists. The philosophic descendants of Kant have occupied a curious position in the matter. They have apparently seen, what Kant did not see, that the original premiss is false. They have pointed out that the sensation, as interpreted by Hume and his followers, is an abstraction. They have gone much further than I can follow them in dwelling on the relations necessarily present in every datum of sense. Now this cuts the ground from beneath Kant's feet; it destroys every argument for a spontaneous action of the mind, constituting the relations in which sense-data stand. Yet the very thinkers who annihilated Kant's premises have pushed his conclusions to their extremest point, and have taken the whole of the data of apprehension as constituted by the activity of thought. The case stands, roughly speaking,

¹ I speak throughout as though this were true of *all* such contents; and so I believe it is, for reasons to be given lower down. But I may remark that it is quite enough for our purpose that *some* sense-contents should be complex.

thus. Hume,¹ developing the atomic view of sensation, spoke loosely of a knowledge of the order of impressions or ideas without appearing to see that this postulated a very different kind of knowledge from that of the "atoms" themselves. Hume's followers explained this knowledge as arising out of the sensations themselves by a psychological process. Kant, seeing that this was impossible, explained the element of order and relation as arising from the mind, as "spontaneity." Kant's followers, arguing that the separation between sense-data and their relations was a figment, extended Kant's idea in such wise as to make the activity of thought constitute the whole of experience, subject to more or less doubtful reservations in the interests of the "given" element. But their argument, instead of developing Kant's idea, extinguishes it. Just because there is no sensation given without relation, it follows that there is no need to postulate any mental activity to make us aware of relations except the capacity to apprehend them.

2. But it will at once be asked, What of space and time? The distinctions and relations we have examined involve a spatial or temporal order. We cannot perceive our two peas unless they are separate either in space or time. Then are space and time also apprehended? Not perhaps space and time as two great individual wholes, but the spaces and times in which qualities and relations are presented to us. These are just as truly given as the qualities which occupy them.

If I lie on my back on the grass and gaze up at a cloudless summer sky, what do I see? Not a congeries of blue points which I combine into an extended surface, but from the beginning a blue extent.² I see extension just as I see colour. There is no more reason to say that I see the colour and construct the extension, than to suggest that I am given the extension and lay on the colour. The two characteristics of the whole are distinguished only by an act of abstraction. As given, they are indivisible. Nor is this all. What I actually see is not a blue surface merely, but a deep vault at a distance from myself, and into which I seem to see. In short, it is not surface only, but volume. If, lastly, as I gaze a cloud comes up, I see it in a particular part of the blue expanse, and if there

¹ "The idea of time is not derived from a particular impression mixed up with others and plainly distinguishable from them; but arises altogether from the manner in which impressions appear to the mind, without making one of the number" Hume, *Treatise*, part ii. § 3. Green & Grose's edition, p. 343). Cf. Locke *Essay*, bk. ii. chap. xiv. § 3. Space, indeed, is still for Locke a simple idea (bk. ii. chaps. iv. and xiii.). To Hume it is the "manner of appearance" of ordered or tangible points (*Treatise*, loc. cit. p. 341).

² Contrast Hume, *loc. cit.*

are many clouds, I see their shapes and sizes, and the inter-spaces of blue that part them. That is, I see position, magnitude, and distance.

Yes, it will be replied, you see all this because you have learnt to see it. It is no primitive perception, but acquired; formed by the clustering of many sense elements originally distinct, but now so grown together that you take them for one. Or another objector in the interests of a different school may urge, your present object may be a primitive, original kind of representation, but you must not talk of it as being apprehended or given. What is given you is the mere sensation, the mere isolated feeling or multitude of feelings. Your own mind reacting on these forms the extended surface.

Beginning with the first objection, let us mark our position, which, be it remembered, is dictated by the requirements, not of psychology, but of logic. We may admit at once that our present space-perceptions are in a great degree the result of education. I should not see so accurately as I do if I had not been seeing all my life; while you, who have specially trained your sight for this purpose or that, can see many things to which I am blind. Attention and discrimination can be cultivated, no one doubts, and attention and discrimination must have their effect on our perceptions of space. But this much can be said of every conceivable perception. To go no further than the eye, the artist's sense of colour is very different from yours or mine. He sees shades to which we should be blind; and if he can teach us in turn to see them, it proves all the more how much the training of the faculties can do. I do not, then, contend that my space-perceptions as I now have them are the same as they were the first day I saw the light. Beyond a doubt they are products of development. But so, I add, are hundreds of other perceptions enjoyed by the adult man.

But if we give up "originality" in this sense, what do we maintain? Two things: (a) that however much our space-perceptions have developed, there is no evidence that they are evolved from non-spatial perceptions: (b) that our present space-perceptions are simple acts of apprehending what is given, not resolvable into a composite activity consisting of a sensation, plus something further. Of these contentions the first is matter primarily for psychologists, since it concerns development. But, in fact, it depends mainly on the second contention, which is of immediate concern for us. Let us turn, then, to this contention.

Our opponents, we have said, are of two classes, which the reader will, no doubt, have already recognised and named

Empiricists and Kantians. Differing widely in general result, they agree in one supposition, and further than that supposition we shall not need to follow them. They both postulate that what is given is really a spaceless sensation; and that being assumed, they try to show in different ways how this sensation is formed into an extended object. This postulate we deny. So far from being necessary or plausible, all experience is against it. We never see an unextended object, we never touch one. From the beginning, so far as self-observation or memory can inform us, we are given objects extended in space. Some psychologists would go a step further, and say that we are never aware of any sensation whatever that is not extended or voluminous. Sound, smell, and taste are all, however vaguely, extensive and localised. Aches and pains have their seats; nay, emotions and thoughts, when I observe them in myself attentively, seem to take their place in my head—my thoughts, for example, seem located just behind my forehead. But we need not generalise so lustily. It is enough for our argument that *no sense-content definitely known to us as extended is also known, or can be remembered, as being given in an unextended form.* That is, the unextended datum from which space is to be formed is a figment. It is an invention, not a discovery. Equally fabulous is the act of the mind, which imposes the form of space on this non-spatial content, and equally unverified the association which calls up other unextended sensations to amalgamate with the present. It results that the apprehension of things in space is not a composite act in which one element only is given, but a simple act the whole content of which is given. Space, then, is given in apprehension; and the apprehension of space is an apprehension of the present, not an act which introduces to it relations that are not presented.

3. So far we have dealt with extension as such. With regard to the special question of visual perception of distance, there are, no doubt, difficulties psychological and still more physiological.¹ But here again the primary fact, the best known fact, is the analysis of what we adult men actually see. That much of what our sight means is due to experience, no one could deny. But this does not prove that we do not see what we do see. As I sit in the garden and look through the misty September air at the house, I see the interval as well as I see the house. This interval means to me (*inter alia*) so many paces, such and such an effort, such and such a time, if I want

¹ I say nothing further of these, since it would be absurd for me to attempt to add anything to Professor James' masterly discussion (*Principles*, chap. xx. p. 212 ff.)

to go into the house. This meaning is tacitly a correlation of my present perception with many memories of touch, and of the sensations, whatever they are, involved in walking. Without these memories the interval would mean much less. Like a baby, I should stretch out my hand to pluck the clematis on the wall. This is all verifiable, for (at least on the smaller scale) I observe it. If I compare the distance as it looks to-day with my recollection of it a week ago when the air was clear, I am aware that in appearance it has increased; and it is only an experience some steps, at least, of which I can recall which has taught me to allow for the difference made by a mist; has taught me, namely, that what is for my walking or my touch one and the same distance, is to my sight greater or less according to the nature of the medium that intervenes. But in all this there is nothing to show, nothing to suggest, that the visual perception of distance is itself acquired. The relation of this perception to others depends, doubtless, on those others; but it depends also on the given quality of the perception itself. You cannot eliminate either term and leave the equation standing.¹

Lastly, extension as such is only the most abstract characteristic of extended things. What is extended contains also size, shape, and position; if it is given in the first character, it is given in these three as well. I no more add these qualifications to the objects I see, than I add their extension. This will become clearer if we deal with two objections.

First, it may be urged that if anything is relative it is size and position. Take size. What do I mean by saying that this table is 3 feet long? Simply that its extremities will tally precisely with those of a yard measure, that it is half a fathom line, and so on. That is, I mean by the alleged size one or more equations, one or more relations between this object and others. This is true in its way. The total meaning of a size includes relations to other sizes. But that these relations should subsist there must be something to be related. What is it now that is equal to a yard measure? This surface; and how do I judge it equal? by apprehending its size as given.²

¹ In any case the difficulty concerns vision only, and not the perception of depth as such. This seems often to be overlooked in discussions of the problem. You need only dip your fingers into water to convince yourself that touch gives extension as three dimensional. And there seems no evidence whatever that the perception in this case is in anyway derivative.

² Of course, this judgment may be based on superposition and then collapses into a perception of coincidence between the boundaries of the contiguous objects. But we form approximate judgments of size without employing measurement, and they are based on the size as given. It is to these that the text refers.

Quantities are given, and when given they are related. If they were not given there would be nothing to relate. If we grant to the full that a given size is definable only by relation to others, this only puts size on the same footing as any other given content, and does not begin to destroy it as an apprehended characteristic of the present.

4. With regard to position the case is different. We may doubt whether any meaning can be attached to this word unless it expresses the relation of one object to another.¹ How, then, can such a relation be given? Readily enough, if the apprehension of relations be admitted, whenever an extended surface presents us with two or more points. But that is as much as to say that every *definite* perception of an extent is the perception also of positions. The direction of the lines, the position of the words on this page, are as much parts of my present apprehension as the extent of the page itself. It is impossible to regard the one as given and the other as recognised by any other process.

There is, indeed, one difference which brings us to the second objection. Above, in arguing that space is apprehended, we were able to characterise the non-spatial colour or touch as mythical. But can we now stigmatise the sizeless, figureless, positionless extension in the same way? Professor James tells us that we cannot.² There are indefinite space-perceptions without form or order—such, for instance, is my headache; or, to take a more interesting example, the “murmur of innumerable bees” that is all round me and everywhere this morning, a vaguely extended sound, shapeless, and without special position. Can we regard a vague extension like this as the source of our definite ideas of shape, position, and size? In a certain degree, I suppose, we not only can, but must. It is in accordance with all analogy to suppose that our knowledge of space progresses from the vague to the definite, and how vague its beginning may be we cannot well say.

But granting this, there are two ways in which the progress may take place. One is by analysis (of which, in general, we shall treat presently), the other by synthesis. If the process is analysis we may be said to find parts, quantities, positions, etc., in the given whole; if synthesis, we must be regarded as constructing the whole from given elements. I will briefly state my reasons for supposing analysis to be the process here concerned.

¹ I do not say that this is the whole meaning of the word. I merely wish to take the question in the form presenting most difficulty to my own theory.

² *Loc. cit.* p. 145.

In the developed visual perception of space its parts appear to us as given elements in the whole. The position of each point either is its relation to some other point determined by some interest attaching to it, or is its relation to the whole. In this case the position of the point appears as given, just as the extension of the whole is given. The only new element required is an analytic movement of attention (of which we shall speak presently), which singles out this point as something to be regarded on its own account. Now here, as it appears to me, we have the ultimate account of the matter. It is no explanation of space; it is a mere analysis of the facts. But, it is objected, it is an insufficient analysis not taking account of all the facts. For to make our account possible any point A must be known in some way in itself: it must at least affect us differently from B. Otherwise, in the given surface we should not see A and B as two points, but as one. But how can A and B by themselves affect us differently? We cannot, the argument goes on, know A's *position* as long as we only know A; for how can we attribute position to a point except in relation to some other? We are involved, then, in a paradox. Two points qualitatively alike differ in position and are known to differ. But if you take either point singly it is just like the other, for it differs only in position, and its position, while you take it alone, is non-existent. From this paradox the theory delivers us through the conception of local signs. A and B have each a peculiar mark (other than their colour, etc.), felt by us, which, while not itself the fact of their position, indicates their position to us. By an associative synthesis of such points, each with its own local sign, we get the relations of the points in space.

This theory appears to me to make its own difficulty. You may take two views of position. Either it is a *qualé* attaching to A and B as such and separately; or it is an expression for A's relation to B, and for B's to A (supposing no other points to be taken into account). If, first, it is a *qualé*, there is no difficulty in regarding it, the position itself, as immediately given in the apprehension of A and B separately. If it is not a *qualé*, then nothing of the kind is given when we perceive A and B separately; but when we attend to the two together they are together given as connected by the line A B. This would be only one of a multitude of cases where two things together constitute something more than the sum of the two regarded as a matter of pure addition. But it will be answered, A and B must affect us differently, or we should not see them to differ. Doubtless, if you regard them as physical objects they must act on different points of the retina: a different physiological

process must be assigned to each, and the sum of these processes produces in consciousness the apprehension of the whole A B. And on the hypothesis that position can only be known through relation, we must assume that the point A, regarded as a physical object, sets up a physiological process a, issuing in the apprehension of A sole and therefore positionless: that similarly B sets up b, physiologically different from a, but not different enough to issue in a consciousness different from that of A; while A B together set up a b, a total process which results in the perception of A and B in their relation to each other. The point in which a and b differ may then be called the Local Sign. Whence, on this hypothesis, the local sign is an element in the physiological process incapable of mental expression unless in combination with another local sign. In such a combination it gives rise to the apprehension of position: otherwise it remains a purely physiological process. To the Local Sign theory then I propose a dilemma. Either your sign means, in fact, the position of the point regarded as belonging to the point as such; or it is a characteristic to be postulated in a physiological process. In neither case is it a content present to the mind distinct from but indicating position.¹ If, indeed, I could for my own part verify the existence of such a content in my consciousness, I should accept the existence of local signs, though I should still have great difficulty in understanding how they help me to form my space-perceptions. But when I am told of the difference between a prick on my hand and a similar prick on my foot, between a toothache in my left upper and the same in my right lower jaw, I can only feel that the difference is one of position. I can think of this position as attaching to the pain itself, but only as the very same characteristic which brings it into relation with other feelings. I conclude that either the position of the feeling is itself an element in the total content making up that feeling, in which case it is given in and with the feeling, or that it is the relation of the feeling to some other, in which case it is given when the two feelings are given together. Since we cannot apprehend any point by itself, we cannot strictly decide between these alternatives; but in no case is there evidence for any further felt characteristic attaching to a sense-content other than its position, which is yet the determinant of its position.² The simplest account then, on

¹ The dilemma is not quite parallel to that propounded by Mr. E. Ford (Mind, N. S. No. 6, p. 218). But the argument is essentially the same, and so is the conclusion, viz. that position cannot be explained as derivative.

² For the opposite view, see James, *loc. cit.* pp. 153 ff. I am greatly indebted to Dr. Ward's account of "Local Signs," which is nearly identical with the above (*op. cit.* p. 54), but I do not see why he should retain Lotze's

my view, starts from the given wholes of space: it recognises that these may be comparatively definite or indefinite as they are presented to us: it holds that by attention and analysis we can detect in these data parts or elements, that is to say, figures of definite size and position; it recognises that differences of physiological process in nerve and brain must accompany the apprehension of different positions, but it can verify no felt element in consciousness corresponding to such processes excepting the apprehension of the positions themselves.

5. It remains to ask whether time and contents, like change and continuity, involving time, are also matter of apprehension. The analogy of space would suggest that they are—that we apprehend *extended processes* just as extended objects. But contents involving time present a logical difficulty. The fact apprehended, we have seen, is *present* to, and so qualifies, the apprehending consciousness. That which is past, therefore, it would seem, cannot be matter of apprehension. Now change, for example, occupies time, nay, the very conception of it involves time. The first phase in a changing object is over before the second one is present. Hence it would appear that the two stages cannot be present together; and if not, how can they be apprehended as change? If we apprehend A, and then again B, we have two successive apprehensions of two different contents, but not the apprehension of change. We can say, "There was A and there is B," but what do we mean by saying A has changed into B? By successive apprehension of different facts we do not approach the idea of change.

It may be urged that the statement that A must be over before B is present is false; in fact, the definitely marked stages A and B are the results of an abstraction. There is no gap in time. There is continuity. Quite so, but how do you apprehend continuity? That, it will be admitted, involves time; it must have beginning and end, or at least earlier and later. A continuous process in which there was not earlier and later would be like a line in which there was no distance separating its termini; it would, in fact, be a point in time. But if there be an earlier and a later, can they both be present at once to consciousness, so as to be apprehended as one process? If not, how do we apprehend continuity? Once more, the apprehension of A, succeeded by another apprehension of A, is not the apprehension of a continuous A — A.

The same consideration destroys in advance a theory that might otherwise account for the idea of change. It might be terminology. For Lotze's view see *Metaph.* bk. iii. chap. iv. and cf. *Ziehen, Phys. Psych.* pp. 76 ff and 122 (Eng. trans.).

said—in the change from A to B, if you analyse it a little further, you will find an identical element, such as X, persisting amid differences such as a and b; so that really we have, not A and then B, but a X and then b X; and this identity in difference is what we mean by change. But clearly we should not (at least by means of apprehension) be given the identity of X—X unless we were aware of them as forming a continuity. Neither continuity nor change, motion nor rest, duration nor succession, can be given to successive acts of apprehension, unless given to each act singly.

We are then in a dilemma. Either these contents—all contents, in short, involving time—must be constructed out of data of apprehension by some different process; or, if we are to regard them as apprehended, we must admit that successive facts are present to one and the same act of apprehension. Paradoxical as it seems, I believe the second alternative to be the right one. The immediate past remains actually present to the apprehending consciousness. When I am aware of a change from A to B, the stage A is present to my mind along with B, and the whole present to me is to be expressed as "A followed by B," or "A passing into B." At first sight this appears a direct contradiction in terms. A is past; how can it be present? I admit that it requires a little explanation.

6. To begin with, apprehension itself, regarded as a psychical event, occupies time—how much time is a very difficult thing to determine experimentally, but some time. Even the simplest fact requires time to take it in. Here, then, it seems, is an explanation ready at hand. An act of apprehension occupies, say, a second.¹ All that goes on in that second, change, rest, motion, persistence, the abstract character of the duration of the second itself, is all contemporaneous with that act of apprehension, is therefore present to it. This, if put forward as an explanation, however, ignores the whole difficulty. Duration (and all facts involving it), to be known at all, must be known as a whole including parts, as having an earlier and a later. Now, if we keep to the idea of the "present" as something of which the parts are simultaneous and concurrent, we shall see that our act of apprehension, extending over a second, will be aware of everything that happens in that second, but that there will be no point in it at which it will be aware of the whole. Repeating the argument for any fraction of a second, you get the same result. Duration is something composed of earlier and later. The two are never physically present together. The earlier is present to an earlier part of

¹ For the actual experimental determination of its duration, see below, p. 55.

the act of apprehension, the later to a later part, but never both to one and the same part. Conceive apprehension or its object as two processes going on in time (whether at rest or in change), and take a section through them both at any moment; you will find always a point in the one watching a point in the other.

Here a possible explanation suggests itself. There is some irreducible atom of apprehension of exceedingly small duration; to this is given the simultaneous stage of the observed process. Now, after a certain time, these atoms accumulate, and compel attention, which thereupon fuses them into a whole, and turns out a perception of change. The last fractional part of the change is still matter of immediate consciousness, but all the earlier parts are really memories, and the apprehension of time is a fusion of present apprehension with primary memory images. But there are two objections to this. In the first place, it is not so. We cannot "produce" the atom of apprehension, the momentary awareness of a tiny bit of fact. Every apprehension of a fact, or (equally) every fact as apprehended by consciousness, lasts an appreciable time, whether at rest or in process. Our datum, as introspection gives it us, is an apprehended content, with appreciable duration. And, further, though the facts are not so, if they were so they would not help us. For the atom of sensation must still occupy time, and the same difficulties recur on the smaller scale. Does it, or does it not, apprehend, as a whole, all that passes before it?

We must therefore substitute a different conception for that of atoms of apprehension. Every act of apprehension lasts an appreciable time, say a second, and yet forms in a sense a single whole. All that comes before consciousness during that time remains present during the whole of the time. At the end of the second all the process that has been presented from the beginning is present to the mind, along with the final stage of the process. The mind views the process as one whole. This does not, of course, mean that that which is past is at the same time present in the same sense in which it is past. It means that the act of apprehension is of the immediately past as well as of the present.¹ That which has been presented remains in the mind, still qualifying it, still going to form the content present to it, along with that which is now being presented for the first time. The completion of an act of apprehension involves the apprehension of all that has been presented to that act.²

¹ Or, in other words, "past" has two meanings: (*a*) = "earlier than any given point of time; (*b*) gone from consciousness, and if the given point be the "now," what is past in sense (*a*) need not be so in sense (*b*).

² Cf. Ward (*op. cit.* p. 64), and James, *Principles*, chap. xv.

To further illustrate and explain, let us divide our second into quarters, apprehending the process $a\ b\ c\ d$. Now, whether as an event independent of consciousness, or as an occurrence in consciousness, a is certainly not contemporaneous with d . But a is presented to the mind in the beginning of the second, and as a content apprehended by the mind continues to exist through the successive presentations of $b\ c\ d$, i.e. its occurrence at the beginning of the second continues to be an element of apprehension until the end of that time. Thus, at last, the whole $a\ b\ c\ d$ as facts succeeding one another are all simultaneously presented. The apprehension is of what has just arisen together with that which is just now arising. Both together form the actual present content of consciousness.

Again, we must not, because $a\ b\ c$ remain present after they are given, infer that at the stage d they are apprehended otherwise than as they have been given. On the contrary, the retention of the earlier elements is merely that which enables us to apprehend the whole as it is given. But what is given is not $a + b + c + d$, but $a\ b\ c\ d$, a continuum in which a passes into b , b into c , and so on without a break. This continuum, therefore, is the true datum of apprehension, and so, when we speak of a as remaining present along with $b\ c\ d$, we must remember that it is present in a different way at each stage. At the stage a it is the incomer, at b it is passing, at c it is removed further, at d it is vanishing. What is presented is a passing process of which we see always a segment. And each point in this segment is continuously altering its relation to our consciousness as it approaches, occupies, or recedes from the focus of attention. None of the words we use can explain this perception. They can only express it; and our business, be it remembered, is not to explain, but merely (a) to formulate what is given, (b) to explain away any apparent contradiction in our statement. In this case the given (in our view) is a segment of a temporal process, and the apparent contradiction the difficulty of understanding how a segment of time could be present in one moment. Our "explanation" consists merely in pointing out (a) that the earlier time or phase is present in a sense that does not contradict its pastness, i.e. it is "past" as preceding the "focus," and present as remaining in apprehension, and (b) that though remaining, it is apprehended as preceding the newer phase. We do not therefore pretend to explain the perception of time or continuity. We only say that, in fact, we do perceive time, and that the two postulates which this perception involves offer no real difficulty, but are verified by our actual consciousness when we examine it.

We may compare and contrast our present suggestion with a well-known physiological law. A momentary stimulus may or may not give rise to a sensation, but if it does so the sensation outlasts the stimulus. In accordance with the law of the persistence of sensation, an electric spark, lasting $\frac{1}{1000}$ of a second, gives rise to a seen spark enduring for an appreciable time. Hence, if two sparks be passed in rapid succession before the eye, though, as physical occurrences, one is demonstrably over before the other begins, they are actually seen simultaneously, they appear to be two simultaneous sparks.

Now in this case it is a physical process outside the body which passes and leaves behind it an effect upon the nerves, and a sensation which we call the perception of the outer process. The perception, then, though present to the mind, is the perception of something that is physically past. So far we have a parallel to our case. But in the perception of duration it is not merely the physical stimulus, but the earlier part of the perceived process, which is past and yet present, which is apprehended as having just occurred, and as passing into the next phase. Thus in the spark-experiment duration is perceived, not because the perception of the spark does, in fact, last longer than the stimulus, but because the mind apprehends the rise, persistence, and extinction of the spark as present to it in one final moment of apprehension. In persistence of sensations, then, the effect of the physical stimulus lasts on in consciousness after the stimulus is over; in the perception of duration, the first apprehended fact remains present to the consciousness during the apprehension of the next. Nor is the mere persistence of a content equivalent to the perception of continuity or change. The same sensation might continue for hours, but its persistence would not be the knowledge that it persists. Once for all, knowledge of continuity means, not the persistence of consciousness in an identical condition, but a persistence which involves change, which presents, indeed, the content of one moment to the apprehension of the next, but presents it as earlier.¹

¹ Another physiological law has a more direct bearing. Any given stimulus (e.g. a ray of light) may be insufficient to produce a sensation, but may aid another to do so; so we may have two stimuli a, b, each severally inadequate to move my attention, but together capable of causing a sensation. In this case of summation of stimuli each stimulus has its physiological effect, and each effect contributes to the result in consciousness; yet neither would have any effect on consciousness without the other. Thus the lowest sound I can hear, the dimmest light I can see, have already a certain intensity. Stimuli failing to produce sensations of such intensity produce no sensation at all, but have some physiological effect all the same. They produce a subliminal excitation. Now, if a b c are simultaneous and similar in kind, they simply

Lastly, our division of apprehension into parts, with definite contents a b c d must not mislead us. We shall see presently what value such divisions may have. But we must note here that a is not given as a stationary content to which, with a leap, b succeeds. The full concrete account of the matter is that the transition a - b is the given fact. We can mark out stages a b c d as those at which the several features in this transition are in the first stage of their presentation, but the progress from one to another is continuous. And it is precisely this continuity which is always present. When a has passed continuously through b into c, this passage is all present to apprehension at once; and the same is true *mutatis mutandis* at every point in every stage. Thus, if we now consider a moment in the process, if we take a section as we did before, we find a different result. If we figure a division between the stream of apprehension as a subjective act on the one hand, and the stream of its object on the other, each section of apprehension will exhibit, not merely the corresponding section of a given process, but the preceding ones in addition as passing into the present. Or, trying to avoid a somewhat unreal separation, taking the stream of consciousness as a whole, and hitting upon any temporal point in it, this point has for its content, not a timeless or "atomic" content, but a segment of definite duration, the several elements in which are apprehended as in different temporal relations to the atomic

fact, and in fusing add to one another's intensity, thus producing a sensation where there was none, or intensifying the sensation already present. But if they are not simultaneous but successive, and not similar but changing, another event is possible. They may produce the perception of a process, a perception which (if a and b are subminimal) may begin with the action of c, but which may include the whole process a b c. This seems to happen when a process goes on some time without awaking attention. When attention is roused we apprehend more than exists in the moment of waking. Thus you can pick up the striking of a clock at the third or fourth stroke and count it successfully. We are generally said to effect this by primary memory images, but in some cases I think these images are really the first belated apprehension of the fact. Here, then, is summation of stimuli, so acting that the earlier object, together with the later, are present to consciousness. This, then, is simply a special case of apprehending duration. In the ordinary case a b c d are each apprehended successively: the apprehension of each is formed before we apprehend the whole, and if some disturbing cause interfere, the process of our apprehension might break off at a or b or c without prejudice to its clearness. In this case the already apprehended contents persist in their order in consciousness and continue to qualify it along with d, so that we finally apprehend the whole process a b c d at once. In the second case, a b c are not adequate physiologically to give rise to consciousness until d is added to them. Here the act of apprehension is not in itself complete until all the elements are present. Until we apprehend a b c d as a whole we have no apprehension at all. This will happen when a b c d together form in time or intensity the minimum apprehensible. And both formed apprehension and preparatory process exhibit a closely analogous law of persistence.

moment taken. Finally, the act of apprehension has a certain minimum time as a psychological event, and cannot have less than a certain minimum of duration presented to it. A series of stimuli inadequate to the presentation of a content of the required minimum will present no content at all, but will remain a merely physiological process.

7. What, then, is the actual capacity of apprehension in the way of duration? What is the greatest duration that can be presented to it, and what the least? How much of duration can we feel at one moment, and how small a duration can we distinguish? Both depend a good deal on the nature of the sense organ affected, and of the stimuli affecting it, and on the state of attention. Thus, listening to the sound of successive strokes, and attempting to apprehend a number simultaneously, Wundt and Dietze found that the highest results were obtained when the strokes followed one another at intervals of 0.2" to 0.3". If the intervals were more or less than this, attention became confused. If the intervals exceeded 4 seconds or fell below 0.18 to 0.11, it was no longer possible to grasp the strokes as members of a group at all. Again, much depended on the grouping of the strokes. It was found impossible not to group them mentally at least in pairs, and so arranged 16 single (or 8 double) strokes could be grasped simultaneously; while grouping them by 8's, no less than 40 sounds could be successfully apprehended, involving a duration of from 8 to 12 seconds.¹ This may be taken as marking the maximal extent of the "present." For the minimum the figures 0.18 to 0.11

¹ Wundt, *Phys. Psych.* vol. II. chap. xv. § 3, pp. 248-252 (3rd ed. 1897). 288-292 (4th ed. 1908). See also James, vol. I. chap. xv. pp. 612, 613, and notes. I give Wundt's figures as they stand, but must confess to some scepticism. All they seem to me actually to prove is that five groups of eight sounds each can make a distinct impression on the mind as a whole and without counting. But that the whole of this long series of sounds are actually contained in sensation at once, does not seem to me proved. The line between apprehension and primary memory is not easily drawn, and I do not see that Wundt took pains to draw it. We may therefore ask whether the first group of strokes has not really become matter of memory before the last is in consciousness, or to take a further possibility, whether the apparent perception of the five groups may not be rather a felt total impression resulting from the forty separate sense impulses, but not equivalent to a perception of them, and hence capable of persisting after some or all of them have disappeared. I do not see how either of these possibilities admits of disproof except by introspection, which would be very difficult in such a case. The only real evidence adduced by Wundt for his interpretation of the results is the remark lower down (*ibid.* p. 251), that the limit beyond which the impulses cannot be grasped together is very sharply marked by a sudden increase of errors to 50 per cent. of all the cases—i.e. to their practical maximum. This point is interesting, but again (to press the sceptical point) might mark the limit of primary memory rather than of apprehension. On the difficulties of drawing a line between memory and direct perception, we shall have a few words to say in the following chapter.

give us some idea. The increasing difficulty of distinguishing more rapid sounds, suggests that here we have the normal limit of clear and easy attention—i.e. it suggests 0.11 as the time during which a content must ordinarily occupy apprehension, if it occupies it at all. But very much lower figures have been given for the absolute limit. Thus Exner appears to have distinguished the "snaps" of two electric sparks at an interval of 0.00205".¹

These results throw light on another point—what is intended by an act of apprehension? Since I first used the word the reader has probably been objecting that it is a vicious abstraction. Apprehension is, in fact, a continuous stream, and to break it up into so many acts is, it will be said, to make artificial and unreal separations. Well, we may note parenthetically that this would not interfere with our account of time-perception. All we should have to say would be that without limiting ourselves by separate "acts," any *point* of the stream of apprehension has, as its object, a certain *extent* of the continuum of presented objects. But admitting the continuity of apprehension, we must also insist that it falls naturally, not into separate parts, but into distinct divisions. We may form these divisions from the point of view of the *act* of apprehension.

¹ Quoted by James, *loc. cit.* p. 614. These results should, I think, be received with some caution. It is, we should remember, the interval between the stimuli which is accurately known; and because two stimuli at an interval of $\frac{1}{10}$ of a second cause distinct impressions, it does not follow that we can apprehend $\frac{1}{10}$ ". If so, we ought to be able to apprehend 500 sensations as distinct in a second. Now Grunhagen (quoted by James, *ibid.*, speaks of feeling 10,000 electric shocks in a second as interrupted. But could he have discriminated them from 5000 or 1000, or even 100? Did not his sensation really amount to a very rapid repetition of, nevertheless, discrete shocks. Such a feeling, if one knew the actual number of the shocks to be 10,000, could be easily taken for a separate feeling for each shock. But unless you could differentiate the feeling of 10,000 from that of 10,001, the inference would be illegitimate. We must further distinguish, at least in thought, between three quantities, all requiring experimental determination. They are—(a) the minimum time during which a content must occupy consciousness; (b) the minimum interval requisite between the apprehension of two contents, in order that they may be perceived as successive; (c) the accuracy with which intervals may be judged. The second and third points are distinguished by James (*loc. cit.*). I know of no direct experiments on the first. But the determination of the second throws light upon it, because it would seem that if the contents remain distinct there must have been time to apprehend the first, and if not, not. But the second measure here is more accurate than the first. For content a, though distinct from b, may continue in consciousness together with b—i.e. it will last longer than the interval between them. This interval, then, gives an outside lower limit to the duration of contents. They must last, at least, for the interval, and may have to last longer. Hence we should take the highest figures, such as Wundt's, to determine question (a), and the lowest, such as Exner's, for question (b). Question (c) is the main subject of Munsterberg's essay on the "Time Sense" (*Beiträge*, Heft 2), but does not here concern us.

hension, or from that of the limits of the content presented. Thus we may speak of a fresh movement of attention (a) whenever there is a change in the object to which we are attending, or (b) whenever attention, though fixed on the same object, renews itself. Under these last circumstances there is ordinarily a fluctuation of attention at periods (according to N. Lange¹) of from 2.5 to 4.0 seconds, the time varying slightly according to the sense organ employed. By a movement or act of apprehension, then, we may mean any redistribution of attention, whether involving a change in the object or not, and we learn that such redistribution is constantly proceeding at a speed which varies within limits, not normally exceeding 4" nor giving any distinguishable results in less than .002" as a minimum. The actual change in consciousness is of, course, continuous; these times mark the upper and lower limits of its distinguishable phases. So much for the act of apprehension. The fact of apprehension or the present content must similarly fall within at most (according to Dietze's experiments) 8"-12"; it may thus (taking Lange's figures) occupy at least a double act of apprehension. Then we may distinguish as separate facts of apprehension, or separately apprehended contents, all such as, whether continuous or not, together occupy more than 8-12 seconds. Where we break up, such a fact may be arbitrary, since it may be given continuously. But even if it exceeds the limit by a small fraction, its extremes cannot be present simultaneously, and it therefore must include, at least, two given contents wherever we draw the line. Thus, if, as is perhaps most natural, we reckon from the end, the beginning of the fact must be a separately given content, and the knowledge of the beginning must rest on a different principle to that of apprehension pure and simple.

We have then a double continuity and, normally, a double discreteness in apprehension. On the one hand, apprehension forms a continuous stream through time, while the things of time form also a continuous stream of content for apprehension.

¹ Wundt, *loc. cit.* pp. 254-257. Münsterberg contests Lange's results and Wundt's interpretations of them (*Beiträge, Heft 2, Schwankungen der Aufmerksamkeit*). But the controversy turns mainly, not on the fact of fluctuation, but on its cause, the *Apperceptionstätigkeit* being, as usual, the stone of stumbling, and Münsterberg contending for the "peripheral" origin of the phenomena. Some of Münsterberg's figures, however, differ from Lange's, and he denies that the *Schwankungen* are universal. (See, e.g., the brief account of his contentions, p. 123.) The question of peripheral or central origin need not concern us, our only object being to get some definite notion of an "act" of apprehension—a notion which experiment alone can adequately limit and fill up. In Wundt's 4th edition (pp. 295-301) the results of Face and other observers are given. The main divergence of interest concerns the regularity of the phenomenon.

On the other hand, but a limited portion of this stream is viewed by apprehension at any one moment: this portion is in constant movement along the time stream; its movement is never stopped and never broken by a leap as long as we are conscious, so at no two moments will it be the same. Only those lesser segments which fall within one such portion can be said to belong to the same fact of apprehension, and hence arises the discreteness or multiplicity of apprehended facts. Lastly, the stream of apprehension itself is marked into acts or movements by the changes in direction, or the periodical rise and fall in concentration, of attention.

8. We conclude that apprehension, rightly understood, can give us relations as well as qualities, and time relations as well as others. And, briefly to indicate the general results of our discussion so far, we have found that the contents of apprehension are concrete and continuous; that an apprehended content is apprehended as fact: and that to be aware of it does not involve reference to any further fact; but that within such a single content time and space, qualities and relations, may be found. False views of apprehension we have found to consist in a confusion of it with the judgment on the one side and the physiological stimulus (or, again, the physical object supposed to cause that stimulus) on the other. And these different confusions, we may add, have tended to play into one another's hands. The "atomic" character of such a physical stimulus as the impact of a ray of light on a single rod or cone of the retina, suggests at once the unrelated sense-datum, and the unrelated datum must be pieced together by some synthetic activity before it can do duty as true sensation. In this and similar ways a wholly arbitrary conception grew up of what "pure sensation" would be if you ever got at it, and it was easy to show that such an abstraction could subserve little or no function in the growth of knowledge. The straw man was easily enough knocked over by the critic who set him up.¹

¹ The confusion of sensation with stimulus is at its height in Schopenhauer (*Fourth Book*, § 21. Cf. *World as Will and Idea*, bk. i. supplement, chaps. ii. and iii.). He goes so far that if by "sensation" we understand stimulus, and by "understanding" sensation, we should almost bring him back to something like our own account. The confusions in Green are more various, and it would scarcely be possible to extract from him any consistent idea of the function of sensation except that it is a contemptible one. The true character of sensation is grasped in its essentials and presented with force by Mr. Shadworth Hodgson (*Philosophy of Reflection*, bk. ii. chap. iv. par. 3, and bk. iii. chap. vii. par. 1), and is admirably developed in Professor James' chapters on Time (*Principles*, chap. xv.), Space (chap. xx.), and Sensation (chap. xvii.). Riehl's criticism of Schopenhauer and Helmholtz is also valuable (*Der Philosophische Aristotelismus*, Bd. ii. Th. ii. a. iii.).

CHAPTER III

OBSCURE, CLEAR, AND ANALYSED CONSCIOUSNESS

1. We have argued that apprehension, rightly understood, makes us aware of concrete wholes in which qualities are given to us in relation to one another. So far, however, we have shown only that these relations are given in the concrete contents apprehended; and this is not a peculiarity of relation. Whatever characteristics of reality are given in apprehension, appear always as characters of some concrete content. An effort of abstraction is required to separate them in thought from their "context." Has this effort any connection with the act of apprehension, or is it carried on entirely by thought working on the basis of the given? We are here confronted with the rise of general knowledge, and our question is, What basis can we find for such knowledge in apprehension? or, perhaps better, what medium can we find through which the momentary apprehension of the particular concrete now present passes into those general judgments which compose the system of permanent knowledge? Of the connecting links one at least can be observed and described in close connection with the act of apprehension, and the discussion of it will also serve to illustrate some important characteristics of that function to which we have not yet alluded.

We have argued at some length in Chapter I. that the content of apprehension is fact, and always fact, and nothing but fact. There is no error possible in apprehension. We dealt with various cases of illusion, and urged that they offered no real exceptions to our rule. Let us now take a rather different case of difficulty which will serve to introduce our present subject. We are asked, "Which is the louder of these sounds, the brighter of these colours, the taller of those two men? How many fingers do I hold up? Is that milk sour? Is this nice? Is that seat comfortable? Are you enjoying yourself? Does that book bore you?" Common experience tells us that it is not always easy to answer these questions, yes or no. "I

really cannot say *what* I feel." Yet I am asked about my actual present feeling. Is not this a direct contradiction of our view that apprehension gives us fact? A possible answer has been already supplied. The question is put in general terms, and requires a general answer. Yes, this is *sour*. Sour is a general term, taking us beyond the presented fact in a way which we shall further analyse when we deal with the qualitative judgment. Now it is quite possible that the doubt or error may be on the side of the idea. That is to say, in the case of error we may apply the wrong idea, in the case of doubt we may not know what idea to apply to the given content. This is, in truth, always the case in an error of description, but at the same time it would be incorrect always to impute the failure to want of lucidity in our ideas. I may be uncertain whether *Mansfield Park* is dull or not, but I am quite sure that *Pride and Prejudice* is amusing. This shows that the want of clearness rests, not in my idea¹ of what is dull or amusing,—for give me the appropriate sensations, and I have no doubt about the ideas corresponding to them,—but in the sensations with regard to which the question is asked. Now there is no real paradox in this. *Mansfield Park* as I read it gives me a series of sensations, feelings, ideas, and what not; but the attributes of dullness or amusement simply are not sufficiently prominent among them to characterise them in a definite way. Or—as it may be objected that *Mansfield Park* is not a simple given fact, but a name for a long string of presentations—take a simple sense quality. Had Mr. Pickwick's punch orange-peel in it or not? The punch gave Mr. Pickwick certain definite sensations apparently of a gratifying character; but had it the flavour of orange-peel or not? It will be remembered that a special experiment had to be made to settle this question in the negative; but that once settled, Mr. Pickwick was so confident of it that he was able to make several confirmatory experiments without fear of harm—from the orange-peel. Now, here we observe two things. First, the original sensation of taste had a perfectly definite character of which no one expressed any doubt. Secondly, Mr. Pickwick's idea of orange-flavour was definite enough. What was indefinite or uncertain was the presence of the flavour in the first glass of the punch. As a matter of fact, in the punch, regarded as a physical liquor, there was no orange-peel; but in Mr. Pickwick's sensation in tasting it there was, it is to be supposed, "a suggestion" of the taste of that substance. So again, if an

¹ My idea, in the sense of my taste, may, of course, be very bad, but that does not affect its clearness.

experimenter asks me to determine which of two colours is the brighter, regarding the colours as etherial vibrations or as stimuli of the optic nerve, there is no doubt that one is, as a matter of fact, stronger than the other. Again, the two colours have each, as I apprehend them, certain quite definite characteristics. But taking them as contents of my apprehension, and asking about this particular characteristic,—their relative intensity,—what do I find? Really I cannot tell.

2. We are now in a position to give an account of these facts in harmony with our general theory. The simplest case arises when the content about which I am asked simply does not occur in my apprehension. You ask me which is the brighter. Really I do not see. There is (as the experimenter knows) a difference in the intensity of the stimulus. But this difference does not produce a corresponding difference to the mind of the "subject" experimented on. He sees two colours; he does not see the required relation. In all such cases, then, the content about which inquiry is made, and about which we are left in doubt, is one which is usually or possibly present as the result of certain physical stimuli, but is not present in this case.

But there are not only cases where we simply and definitely do not know. There are all gradations of certainty, from blank doubt to positive assurance. These depend, then, on the definiteness or clearness with which the content is given, which may range from 0 to 1. The content may be thoroughly definite in certain of its characteristics, as explained above, while very indefinite in others; or it may have a very low degree of definiteness altogether. As far as it is indefinite or dim, whether in whole or part, just so far is it difficult for the mind to catch the relation in which it stands to its ideas. Now, what do we mean by this "clearness" or "definiteness" of a content? How can clearness have degrees, or a content be other than that which it definitely is? Two suggestions may be negatived. First, clearness is not the same thing as intensity, though there is a loose general relation between them. A presentation must be given with some degree of intensity to be given at all; above this limit intensity and clearness increase together up to a certain maximum, beyond which, as intensity increases, clearness rapidly declines until the effect becomes stunning. Thus many pains which have distinct and well-marked characteristics in their moderate degrees become merged as they increase in a simple, undistinguishable, overpowering agony. Second, the distinction between clear and obscure does not depend on two ways of having a content presented. It is often loosely said that the

sensation X was present all along, though we did not observe it, or was confusedly present though we did not distinguish it, or was really felt by us though we did not attend to it. Thus the overtones of a note are really present to me,—or I should not appreciate its timbre,—but my ear must be educated if I am to distinguish them as separate tones. Or, again, half the effectiveness of the true Doric column arises from its slight convexity, though not one per cent. of its admirers suspect it of deviating from perfect straightness.¹ The curvature, the overtone, must then be present to consciousness, though not present as such. But this as it stands is a flat contradiction. Either X is present to consciousness or not. But if present, it is present as X, not as anything else. That it should be present and yet not be present as itself is an impossibility. Then, is it present unconsciously? This would be another contradiction, for the present is simply that of which we are conscious. Then what is its relation to the mind? There are two possibilities—first, that explained above: X is the result of a stimulus x. Under one set of circumstances m, however, x does not produce any sensation; change the circumstances to n, and free play is given to it to produce X. Then we say X was present all along, meaning really the objective stimulus x. This is the case with Helmholtz's² instance of *muscor solitantes*, which as a rule are altogether unnoticed. What is always present here is simply the flecks of opaque matter in the vitreous humour. There is no seen spot presented to the normal consciousness. So with the blind spot and countless instances. But, secondly, there is a more subtle case in which the stimulus x, working along with m, really produces a certain modification of the resultant consciousness. The curvature of the Doric column is not seen to be curvature; but if it were not there much of the seen or felt grace of the column would be gone. So with numberless artistic effects and impressions of every sort and kind. When we cry out triumphantly, "That's what I have been feeling all along," we feel the clearing up, the crystallising of elements of consciousness that were already there in a sense. But in what sense? Not the new content now perceived, but some other content, corresponding to it, was really present. Not the curvature, but the proportions attaching to it, not the overtones, but the sound constituted thereby, was the real element in the unanalysed consciousness. Not the metre or the cadence, but the feeling produced by them, is first perceived, then comes

¹ Ferguson, *History of Architecture*, vol. I. p. 249 ff.

² See James, *op. cit.* II. pp. 616-622.

analysis of metre or cadence, and perception of the feeling as interwoven with them. Now, if we may formulate the case as a whole, the stimulus *x* operates on the mind all along, at first introducing a modification into the consciousness *M* such that it becomes *M'*, and then when attention is aroused, producing in it the distinct element *X*, upon which the previous modification of *M* is seen to depend. To give a rather simpler instance than we have yet suggested, when I peer through a fog and gradually make out a number of dim outlines to be a man, a horse, a tree, and so on, each one of these "objects" regarded as physical things existed all along; and each one was represented in my first perception, that is to say, the clear contents of my second and clearer perception are judged to correspond, each for each, with the dim shapes of my first. The outer object is represented in consciousness throughout; it is represented by elements which differ, but yet are felt or judged to correspond. If, now, in this easier case, we ask in what the correspondence consists, we shall see that it is the persistent presence of some attribute to which, in the "clearer" consciousness, more attributes are attached.¹ The dark object before me turns gradually into a man. It never ceases to have a separate and continuous outline, to be marked out by contrasts of colour and so on, though to these bare attributes many more are added in the clearer apprehension. They form a kind of outline which the later consciousness fills in. The clearer consciousness contains what was present to the more obscure, only further determined by fresh characteristics. There must be an element of identity between the two or we have no relation at all, and there must be an element added or we have no change. Speaking generally, then, any content either is present in consciousness or it is not. Its being given, or present, our being conscious of it, are simply different expressions of the same fact; it can never be given clearly or obscurely, for it is simply itself, and can be given only as itself and only in one way. But it may be looked on as presenting clearly what another content presents obscurely, when it contains attributes which further characterise and differentiate those already given in the "obscure" content.² Of this further definition or differentia-

¹ The further attributes, that is, characterise the very object to which the present attribute already belongs. That is what we mean by such expressions as "interwoven," used above. Other expressions, such as "dependent on," "constituted by," are appropriate to special relations of the attributes, which will become clearer when we deal with analysis. But the common point in all cases is the persistence of an attribute and the accretion of others round it.

² Hence it happens that, as Mr. Shand has shown (in the article quoted

tion there will be two cases. It may consist merely in an added emphasis or intensity—e.g. a vague, dim colour may brighten and define itself into an unmistakable green or brown. Here the clear content is as simple as the obscure, and it is known as clear merely because it is more distinct than others. Or the differentiation may involve some fresh determinant, making the whole more complex. What was before a mere modification of the feeling M , so far operative as to make it M' , but indistinguishable and inseparable from the feeling as a whole, stands out now as a distinct attribute X . Our content is still as a whole M' , but it consists of parts M and X .

3. Now this complexity is not peculiar to objects of clear apprehension; all presented contents consist of elements or distinguishable aspects. Further, these elements may be such that attention may be concentrated on them separately. If M is extended in space, and consist of $m + \mu$, we may narrow attention so as to turn it from M as a whole and confine it to m or μ . In this case we pass merely from one simple apprehension to another, just as we might pass from M to a wholly different P . But m and μ may also be what we know by comparison as abstract or general attributes of M ,—for example, m may be a colour and μ its figure,—and then we cannot attend to the one without being conscious of the other as well. We may, however, call them *elements* of M , because though inseparable they are yet distinguishable.¹ Similarly, when m or μ were separate spaces, they could still be called parts of the whole M , if I attend to that whole, while distinguishing m from μ , as its parts. In fact, we may at any time recognise, not the whole only that is given, but any part or element as a part or element of that whole, distinct—though not necessarily separate in existence—from other parts. We have then an analysis of the given, not yet, as we shall see, an analytic judgment, but an act of *analytic attention*. This term may be applied to any state in which we become aware of any element in the given as a part of a whole

above, we may be clearly aware of an obscure object, viz. if we concentrate attention on that object in such a way as not to intensify the physical stimulus. To put the paradox in another way, the indefinite has its own definite character of indefiniteness, and this, too, we may recognise. As far as this character is concerned, the content might even be said to lose something in gaining those further characteristics which make it clear. All we have to note is that the "obscure" is like the "clear," a *bona fide* content of apprehension, not a self-contradictory appearance that at once is and is not.

¹ Whether psychologically we should be capable of distinguishing them if we did not compare them with similar elements differently combined, is a question which we need not here discuss. It is enough for our purpose that they are distinguishable, whatever psychical mechanism this may postulate.

distinct from other parts. Now, this singling out of the attribute does not destroy nor obscure the apprehension of the whole, but the movement of attention makes us distinctly aware of the attribute attended to as one character of a wider or richer content. Looking at that billiard ball, the fringe of consciousness is occupied by the table and the walls beyond, but I clearly and definitely apprehend the ball (or, more strictly, its coloured surface), and upon the ball—within, that is, the content of definite apprehension—I notice the spot of light where the rays from the window are reflected. Now, dropping the fringe of consciousness out of sight, we have still a complex fact before us. We have the apprehension of the ball as a whole, and the analytic movement of attention which singles out one or more attributes as characterising, as contributing to form that whole.¹ Thus the ideal form of such analysis can exhibit a whole M as constituted by elements pqr ; but any act in which we become aware of p as an element in M , while q and r remain an unanalysed residuum, is *pro tanto* analysis. It is the beginning of it, not the completion.

Up to a certain point and in certain contents the operations of clearing up and of analysing the given coincide. Thus, to break up a confused medley of colours into a distinct pattern of so many reds, blues, etc., is at once to make each elementary colour clear, and to distinguish it as a part of the whole. In short, so far as clearing up consists in unravelling a complexity, it is the same thing as analysis. On the other hand, the clear content may be relatively simple. It may even be a product of analysis (as an element in some whole), not itself admitting of analysis. A clear content, then, is not necessarily an analysed content. Nor, again, is an analysed content always fully clear. *Quid* analysed, it is merely known as constituted by such and such elements, features, or characters. Clearness in this special point is the peculiar work of analysis.

In carrying out this work, analytic attention—and this is why we treat of it at this early stage—does not advance beyond the present. It is not essential to the process of analysing $A = F(a+mb+\text{etc.})$ that these different contents should receive general names, that is, should be classified and described. If we would, as before, isolate this activity, it

¹ It may be asked what we mean by "characterising," "contributing," etc. I can only answer that the words express the relation of an element of a content to a whole. Neither this relation nor the terms "element," "whole," etc., can be defined. They can only be pointed out, and terms such as I have used are merely variants for describing them.

consists in a movement of attention within the sphere of the given, not in an assertion of aught that lies beyond. It may be said that we should never thus concentrate and analyse if we had not general ideas to direct and stimulate us. True, we should not go far without such aid. But it may be that we have here a case of the cumulative action of causes in which analytic attention logically takes the lead. Analysis, as we shall see, is the source of general ideas, and general ideas in turn facilitate and improve analysis, which again brings to light better and more accurate ideas, and so on indefinitely. But the mere act of analysis itself is not either the formation of a general idea nor the subsumption of the present content under one. It is an activity in which the mind operates upon the given content, but does not yet make an assertion of anything beyond the present. There are further conditions on which such an assertion in its simplest form depends, and into these we have now to inquire.

Meanwhile our results have gone to show that what is given to our apprehension contains the elements of a very great part, if not the whole of subsequent knowledge. The relations, the order, of facts are given no less than their sensible qualities. Nor is there any difficulty, if the nature of apprehension is understood, in regarding duration and any contents involving it as "present" to our apprehension. Apprehended contents have more or less definiteness of character in accordance with which their resemblances and differences are more or less marked, and they are more or less easy to describe. A concentration of apprehension known as attention acting in response to stimuli of a special kind rearranges the contents of consciousness as regards their clearness, and further concentration on any point or aspect of a content may go along with a perfectly clear apprehension of the content as a whole. We then become aware of the part as an element in the whole, that is, we have begun to analyse the whole. The completion of this process gives us the totality as constituted by all its parts, features, or characteristics. This state of knowledge must be held to involve an operation on the apprehended content which we may call analytic attention, but does not involve the thought of any reality beyond the present.

CHAPTER IV

MEMORY

A FACT, we have seen, can be present to us for but a brief moment. But the fact that it has existed and been present to us may be matter of permanent knowledge. This persistence or retention of knowledge we have now to investigate.

1. We have already seen a form of retention at work in analysing the apprehension of duration. Here the conception of time as a continuum to which we are forced, compels us to admit that the first elements of a sensible process are presented to the mind earlier than those which follow, notwithstanding which the mind has both earlier and later simultaneously before it. For this purpose it must, as we saw, retain the earlier for a while as matter of consciousness. Again, all phenomena of habit depend on what we may call physiological retention. Higher and lower nerve-centres, and not only nerve-centres, but sense-organs, muscles, bone, and skin, all retain their experiences in the sense that they are often permanently affected by what they do or suffer—affected in such wise that their subsequent reactions are modified. But retention would never be known by us for what it is, it would never be known as an effect of past experience on the present moment, if it did not from time to time give rise to *assertions of the past* as past, that is, to memory. I can only explain this or that present reaction of my limbs or my mind as due to some past experience, if I can remember that past experience, that is, believe in it as something which has happened.¹ It is this result of retention which we who are studying the conditions of assertion, and assertion only, have to consider.

What, then, precisely is memory? To begin with, it is not a mere image or fainter repetition of something which is *de facto* past.² If such an image were all I had by way of remem-

¹ It might be urged that I may know the past experience by inference; but we shall see later that inference in its turn involves memory, both to set it going and to confirm it.

² Contrast Volkmann, *Lehrbuch der Psychologie*, vol. i. pp. 403 and 474.

france, it would be difficult to see how I could know or even suppose that it was an image of the past; for where would my knowledge of the past be? The image as an image is always present fact, which vanishes in its turn and requires memory to recall it from the limbo of departed thoughts. No doubt an image is a normal part of vivid memory, and sometimes becomes a kind of mechanism through which memory endeavours to refresh and strengthen itself. When "I remember the house where I was born," a very distinct and vivid image doubtless rises of the "little window" with its picturesque adjuncts; but that image is something now present to me, something which I apprehend. To have this image before my mind is to apprehend a present fact, not to remember my old home.

It may be urged that, image or not, in any case a memory is a present content. What I remember occurred twenty years ago, but I have the memory of it now; and what is more, my present remembrance is or can be matter of apprehension, the content present to my apprehending consciousness. That is true; but the content in question is not a mere image, but an assertion of some past event. If I am aware of remembering X, I am aware of believing X to have happened, to have been present at some time in the past. "X happened"—that is the minimum content of memory. "X," i.e. the image of X, is less than the minimum. We remember sometimes what we can but imperfectly image, and we image very perfectly that of which the remembrance is inaccurate. Thus, to cite a wide and well-known class of cases, it is very difficult to image a feeling or an emotion, but quite easy to remember one. I can quite well remember how sleepy I was last night, but I cannot in this morning's freshness repeat the faint echo of sleepiness which we call an image. Again, "I have perfectly distinct vision of X in my mind, but whether it really happened I cannot tell." Here is the image without the memory judgment.¹ In short, memory-judgments and memory-pictures are not the same thing, though they tend to coincide, since both are due to the same fundamental facts—the permanence of modifications effected in the organism by experience. Memory, then, is an assertion—or, if you prefer to employ the word as a name for a permanent capacity of the mind, unknown to us except by its results—it is a faculty of making assertions. Now, what sort

¹ It must be admitted that this case is not so common as the converse. It would be unfair to quote the much commoner cases when one's vivid image is proved inaccurate by other evidence, for here there is a *bona fide* memory-judgment, though it happens to be false.

of thing does memory assert? We have said above that it asserts that X or Y happened, i.e. its assertions are of facts that have been in the past. But this definition might be objected to as too wide and too narrow. On the one hand, we are said to "remember" permanent truths, like the multiplication table; and, on the other, it is clear that not all assertions about the past are memories. The life of Julius Caesar is not remembered, but (for us and our historians) inferred from records. Only that can be remembered which *has been given*. And in this sense I may be said to remember the date of Julius Caesar's assassination, that is, I remember to have learnt it. But here another difficulty may be raised. What exactly in this case do I remember? I learned the date in question some time in childhood; I have forgotten the learning, but I remember the date. This does not affect our definition, but suggests a distinction within it. I do not remember the date being taught me, but it must have been taught me. If I were reading about it for the first time I could not be said to remember it. Memory, therefore, is only of that which has been given. But—and this is the distinction—it may either affirm its content to have been given, or simply affirm it to be true, without specifying that it has been given. Thus, if I say that the opening of the second *Aeneid* describes the treachery of Sinon, etc., this is a memory-judgment in the second sense. I know the fact, because I have read the second *Aeneid*, though when or where I read it I may have forgotten. On the other hand, when I remember the great snowstorm of 1881, my assertion is of the first class; I recollect that I was out in it. Memory, then, has a broader sense, in which it is the power of asserting anything that has once become known, and a narrower, in which it is the power of asserting that something has been presented to self. In the broader usage some characteristics of the remembered content—all that is implied in its relation to myself—are dropped. We treat then of the narrower sense as the most typical, and as including all that would have to be said of the other.¹

The most typical memory-assertion, then, is not only that X happened, but that X has been given to me. It is included in this that X is past and was present. It is also implied that X may be a single, individual, given fact, and may be known as such. What is given is individual in that, though it may contain many parts, it forms a continuous whole in time and space.

¹ Cf. Wundt's distinction (*Phys. Psych.* chap. xvii. § 4) between *Erinnerung* and *Erkennung*. I do not find, however, that he marks off the renewal of an image from the reassertion of a content.

Memory as a reassertion of what has been given reasserts such individual facts. It can discriminate similar individuals from one another, and judge their number. It asserts not merely "X," but "that X" which it distinguishes from "the other X." I remember, not merely that I have had a headache, but I remember *the* headache which I had last week, and distinguish it from that which I had yesterday. It is irrelevant here to ask how this distinction is effected, to question whether it is possible to distinguish similar contents otherwise than by diversity of context. This question will come up in its own place. It is enough at present to point out that, by whatever means, memory does distinguish individual cases of given facts, and that it is concerned with such facts, not merely as regards their character, but as regards their occurrence, their existence in the past as facts that have been given. The full assertion of memory, then, is of the form "that X was given."

2. Now these assertions of the past are continually made, and enter into the very structure of knowledge. Apart from apprehension of the immediate present, knowledge could hardly exist without them. Memory, then, is a *postulate of knowledge*, like apprehension. That is to say, if we believe our knowledge to be sound, we must admit that we can from time to time assert the past, and know it that we assert it with truth.

But now as asserting a past fact, memory is sharply contrasted with the conditions of knowledge which we have hitherto discussed. Apprehension is the assertion of the present, and analytic attention operates within the present. The content of each of them is fact, because it is present. In memory the assertion is of the past. The content which it asserts is therefore separate from the act which asserts it. This assertion is now for me present, if I think of it. It is present fact. But it is an assertion of an event which is past. In short, the content is one event, the assertion of it another. Hence, at once the assertion may be either true or false. The past event may or may not correspond to the present memory of it. The series of apprehended contents may or may not contain the one which at present I assert. Hence arise two questions about memory—how do we explain it, and how do we justify it? First, however, let us be quite clear about the distinction.

Memory, we say, is a belief about the past, essentially distinct in character from an apprehension of the present. But apprehension, we ourselves insisted, stretches back into the past, and the apprehended fact passes continuously into the memory-image. Where, then, does true memory begin? Can we use the time-distinction as drawing an absolute line?

We might say that the remembered content is separated by an interval, and is recognised as separated by an interval from the consciousness which remembers it. The memory-judgment asserts that "that was *then*," contrasting the then with the now. But an interval is already present, and recognised as present within apprehension itself. Any point at the back of the perceived segment must be presented as separated by an interval from the point in which attention is focussed. The mere conception of an interval is not therefore a sufficient criterion. To make it adequate, we must further specify that it is an interval separating, and recognised as separating, the remembered content from the whole present fact. In other words, the "pastness" affirmed by memory involves, not merely a time-interval, but a contrast with the presented as presented.¹ What is remembered has been, and is not, a content present to apprehension. In connection with this contrast we may add that the state of consciousness judging, believing, or (broadly) thinking about a content is generically different from the state of consciousness which apprehends a content. Thought and sensation are different states of mind. I can think about what I feel, but *quid* thinking about it I am not feeling it, and *quid* feeling it I am not thinking about it. I do not know that we can reduce this difference to simpler terms, but we can easily be aware of it by attending to our own consciousness. Now memory is a form of thought; it is a belief about something absent, not a consciousness of something present. As soon, then, as our apprehension of a fact passes into the form of thought and recognises an interval separating the fact from all that is present in the form of apprehension, so soon it has become memory.

We may illustrate our point by reverting to the subject of images, and especially "after-images." If

"Music when soft voices die
Vibrates in the memory,"

this is strictly not a memory-judgment, but the persistence of an "auditory image," echoing down the corridors of imagination long after the sensation which gave rise to it has ceased. The "vibration" is as much present apprehended fact as the original music. But when we call it an image, its character has become ambiguous. A reference to the original is introduced.

¹ The "present," we saw, had two meanings—(a) the "atomic now," and (s) the presented or apprehended. Similarly, the past is (a) that which is before the atomic now, and (s) that which is no longer presented. A content must be past in the second sense to be matter of memory (cf. p. 52, note).

And this reference tacitly postulates true memory to compare it with the original, and judge that it is an image. Hence an easy confusion between image and memory-judgment. The contrast between the two is more immediately clear when the after-image is negative. Here the image could not possibly be identified with memory, or we should be compelled to say that my remembrance of a red spot is a vision of green, and my recollection of the sun a dark circle dancing before my eyes.

Finally, the case of Primary Memory, though more difficult, seems explicable as a combination of the after image with the memory-judgment. It is, in short, the case where, whether by accident or by a voluntary effort of attention, I get a good after image, and use it as a basis or a help for memory. In the total consciousness here image and memory-judgment are fused, or the consciousness which forms the one acts at the same time as spectator to the other. The vivid impression which I retain of a striking scene is thus at once perception and remembrance. It is sensation on one side and thought on the other. And if we want memory to remain at its best, we invoke the image from the moment of apprehension onwards, and concentrate attention long and lovingly upon it: if we let the moment go, we have lost the chance—

"Many a face I so let flee,
Ah, is faded utterly.
Ere the parting hour go by,
Quick, thy tablets, Memory."

3. Returning now to the problem of explanation, note, first, that it is really a matter for psychology. The problem is to show how a mind can come to be which knows to-day what it experienced yesterday. It is a question, that is, not of the truth or value of memory, but of the conditions under which it exists. We need not treat this as a "final inexplicability." There are final inexplicabilities enough anyhow, and we need not multiply them, as the old adage goes, *præter necessitatem*. Very likely the progress of physiology and psychology will throw a good deal of light upon the subject. But we must remark that nothing is gained by straining to assimilate memory to other mental operations. To see in memory an identity of past and present, or a continued presence of the actual past fact, is a sheer mistake. The remembered fact is not present to the mind like the apprehended fact. It is asserted; but if we bring our memory into relation with our apprehension, it is at once asserted as past, as having been presented, but as being presented no longer. It is "in the mind" as a

part of the mind's thought, and in no other sense. It is a mere misuse of language to interpret this "in" more literally.¹ If the present moment is not distinct and separate from the past, if the past fact is not absent and gone, then these words cease to have meaning, the most typical instances from which they are derived fail us, and there can be no such things as distinctness or absence. Nor, again, does memory give us the slightest warrant for supposing an actual persistence of the remembered content. The mere persistence of such a content, supposing it possible, would explain our possession of a memory-picture, but would not give us a memory-judgment.² Nor is there in memory any assertion of the present as the persistent past. There is an assertion of the past as distinct from what is now, and the only condition which such an assertion postulates is that the past should have such an effect on us, whether on brain or mind, that we are able at a subsequent time to assert it. What mechanism this involves can be determined only by observation, not by assumption.

We shall return to this question presently. Meanwhile observe that our second question—how memory is to be justified—is more important for logic. To understand it, suppose a recollection for a moment, isolated—uncorroborated by any—

¹ Some further ambiguities which might give trouble here are discussed below, Pt. III, Chap. III.

² It may be said that the memory-image has a "note of pastness," a temporal sign locating it in the past, just as those moors have a sign in their coloring that makes me locate them five miles away. Thus, if I understand Dr. Ward, seems to be at bottom his explanation of memory, and the knowledge of succession (*op. cit.*, pp. 57-68). But to know the sign I must first know the thing signified. If the past is once known by memory, I may study it, and so learn the signs of nearness and remoteness; but if the past is never known directly, how does any character of the present come to be a sign of it? How do our temporal signs get their value?

A similar criticism applies to Mr. Shadworth Hodgson's account (*Philosophy of Reflection*, pp. 274 ff.). "The present representation of cold appears in two surroundings: those called *warm*, and those called *half an hour ago*. How can this amount to the judgment, "I was cold half an hour ago," unless by calling a representation "half an hour ago" I mean that it represents something that then was and now is not—in short, unless we postulate the memory judgment in a more reflective stage? Merely to attend to a present representation is not to be aware that it is a representation, nor is it to think of what it represents—unless by a representation of X we mean a thought of X, and that thought (if X is a past experience) is the memory judgment. Mr. Hodgson's "two present representations," one in past the other in present surroundings, seem really to mean respectively the past fact remembered, and the present memory of it.

Mr. Bradley remarks (*Principles of Logic*, p. 74, quoted with approval by Mr. Bosanquet, *Knowledge and Reality*, p. 18, note). "Events past and future . . . exist for us only as ideal constructions connected, by an inference through identity of quality, with the real that appears in present perception." The

thing else. "I remember walking up here last year." Here is a belief. Can we take it as true; and if so, how can we justify our procedure? If our walk was known by an inference, there would be something to appeal to, something to justify that inference. For example, I might prove to you that I had been there before by correctly naming points in our view. An inferred belief then rests on something else, some fact or admission from which it follows. But on what does the uncorroborated memory rest? On nothing but itself. A felt belief is in the case of memory its own guarantee.¹ *De facto* this guarantee is ordinarily taken as sufficient. No one questions memory without a reason. But for logic the *de jure* value of such a guarantee is a matter of question, and the question is of fundamental importance. But it is a problem that can only be discussed in relation to the validity of knowledge in general. Here we need only define our position provisionally by remarking that—

(a) Felt personal conviction is not a final guarantee of truth, inasmuch as the strongest convictions sometimes play us false, and that in the region of memory as in other cases. Thus the guarantee offered by memory cannot be absolute and final. This, however, does not hinder it from being a reasonable ground of belief in the absence of stronger reasons to the contrary.

first part of this statement appears to me to hover between a truism and a fallacy. My knowledge of the past is, of course, not the bodily existence of the past in my mind. It is not the past's self, but an idea of the past. This is a truism. But to say that that idea is what I know when I exert memory, is a fallacy. The idea or "ideal construction" is another name for the knowledge. We have not (a) the past, (b) an idea, or ideal construction now-present, and (c) the knowledge of this idea, which knowledge is memory. Either (b) and (c) are one and the same fact differently expressed, or (c) is not memory at all, but a name for the state of the psychologist examining the phenomena. Much the same criticism applies to Mr. Bradley's declaration immediately above: "If a fact or event is what is felt or perceived, then a fact that is past is simple nonexistence." If the *present* here means "a fact is something felt now," it is a *petitio principii*, for the whole question is whether the reality known to us must be continued to present feeling. If it means, "A fact—something felt," the conclusion does not follow, for then to remember a fact is simply to judge that something was felt. The argument as it stands does not distinguish between "is" = "is now," and "is" = "is whenever or wherever the subject exists."

¹ Mr. Bradley in the passage above quoted, and more explicitly on pp. 72 and 73 of his *Logic*, argues that the past to be known must be connected with the present through some identity of content. A remembered content must undoubtedly be related to the present in time, and is so far akin to the present that it also was present, and present to me. But none of these points suffer to differentiate it from an imaginary content—whether the imagination be wilful or involuntary. If, then, there is some mark in the content of a memory by which the truth of the memory can be inferred, that mark is still to seek (cf. Husserl, *op. cit.* p. 118). How far its content affects the value of a memory we shall consider in a later chapter.

This we shall assume memory to be, pending our fuller discussion of validity.

(b) Memory is doubtless much more trustworthy under some conditions than under others. Freshness and felt clearness, for example, are important points. But these vary in degree, and it is impossible, speaking in the abstract, to draw a line above which the trustworthiness of memory is to be taken as absolute. Our position will simply be that as felt certainty is to be taken as a reasonable ground of belief, its strength as a ground is *ceteris paribus* proportionate to the clearness and intensity of the feeling.

(c) In point of fact our remembrances do not stand in isolation. Normally, they corroborate one another, and can be supported by inference. The value of such corroboration will be considered later.

We have then to take memory and its normal correctness as a fresh postulate of knowledge, not to be resolved into anything simpler or more immediate; and the content of memory we take to be the assertion that some fact has been apprehended in the past. That is to say, our knowledge and our beliefs as they stand imply, *inter alia*, the general trustworthiness of our beliefs about our past experience; and this trustworthiness in turn cannot be based on any more ultimate mental process, or any more evident truth, which does not tacitly assume it. To that extent the credibility of memory is for logic a postulate. As far as postulates or presuppositions can themselves be subjected to test, so far the credibility of memory can be tested; and how far this can be done we shall inquire later. We only deny that a memory-judgment can be resolved into any sort of inference from premisses not themselves involving memory. Memory is in logic one of our postulates, and not one that can be resolved into any simpler postulate. It is a direct or immediate belief about the past, not a belief based on some other truth; and it claims to be trusted for its own sake, and not on the ground of any premise or any other process.¹

4. It does not follow that memory is to be explained as the work of a distinct faculty. Strictly speaking, indeed, "explanation" on such lines is out of the question, inasmuch as the faculty of memory is nothing more than a general

¹ In view of this directness and immediacy, Mr. W. G. Ward was in some degree justified in producing memory as an instance of an "Intuition." But if so, it is a very fatal instance to intuitionism, since it is admitted that memory may be fallacious, and an intuition is nothing if its certainty is not absolute. There are, I think, other objections to the use of the term, as tending (if rightly understood) to identify memory with perception.

expression for the fact that we remember things, or can do so under appropriate circumstances. If we drop the notion of explaining, there can, of course, be no *prima facie* objection to the view that memory is a distinct and unanalysable faculty. This would only be another way of saying that it is inexplicable. But it is important to make clear that our view of memory by no means necessitates this conclusion. Memory may or may not be capable of psychological explanation. All we contend is that, explained or not explained, its *prima facie* trustworthiness is a postulate of knowledge. If it can be explained psychologically, physiologically, or psychophysically, we shall be all the better pleased.

Our main contention being thus made clear, it may repay us to return to the psychological question and consider for a moment the possibilities of explanation. Taking, first, the Association view, we would remark that it belongs to this division of the subject, and not to any other—to the psychological explanation of memory, not to the analysis of its content, nor to its logical justification. Assume for the sake of argument that I am reminded of A by its association with B, this association is neither the content of the remembrance of A, nor is it a logical ground for the belief that A happened. Punch's traveller remembers Rome as the place where he bought his hat or his gloves, but the sight of his hat is not the memory of Rome, nor is the fact that his hat is on that peg a premiss from which he can logically infer that he was in Rome last April. The only way in which the hat can serve as a premiss is by entering in turn into a memory-judgment—"I certainly bought that hat in the Piazza di Spagna last April; therefore I was in Rome at that time." An associated idea—unless itself a memory—cannot be a ground of memory. It may, however, be a cause of our remembering; and association is, in fact, the only cause definitely established at the present time.

Whether it is the whole cause of memory is quite another question. Three considerations seem to make against its claim to be so. (a) Granting that association may produce belief, this power would be regarded on all sides as proportionate to the strength or vividness of the association itself. But the associations leading up to memory are often so weak as to be untraceable. And even if the associated ideas are clear, we may feel that the connection is so slight as to be whimsical. A look, a sound, and, above all, a scent "put us in mind" of a far off event, but surely have nothing in the world to do with our belief that that event took place. (b) Clearly when

association or, still better, logical connection is present, memory works most easily. Thus, if I forget a line in a poem, I may hark back to the beginning of the verse; and having got a start, may say the whole correctly. But this instance tells the other way. For in the middle of an otherwise correct piece of repetition, a word may suddenly drop out for no apparent reason, leaving a kind of gap in the otherwise connected "run" of remembrance.¹ Now, if association were the sole cause of remembrance, this dropping out would be almost inconceivable. (c) Association is not verifiable as a condition in all cases, and there are countless instances which do not look at all like its work. Memory is almost as capricious as imagination. A recollection "pops up," you cannot tell why. It "comes into your head" in no apparent connection with anything present or past. You think of the distant and remote just as you dream of them, and an unpleasant recollection will in morbid states dominate the mind for days, resisting all attempts to dislodge it, and forcing itself, an irrelevant and unwelcome intruder, into all your real and immediate interests. It is as though certain memories were waiting on the edge of consciousness ready to rush in as soon as a door is opened to them,² while others again have gone wandering far afield, and require a hue and cry to hunt them down.

Passing for a moment to a different hypothesis, the crudest form of psychophysical theory accounts for remembrance (of course) by the re-excitation of the cerebral centres. Let a centre C be excited in a given way. This is a sensation. Now excite it again in a similar way, only rather less. This is a remembrance of the first excitement. Professor James³ has justly pointed out that this is an impossible explanation. If the centre is the same and the excitation similar, we could only get a repetition of a similar sensation, or, at most, an image corresponding to that sensation, not, in any case, a memory of the sensation. Such a memory being a different mode of consciousness, with a different content, involves a difference in its physiological concomitant. Professor James accordingly suggests as an alternative that, while the "nerve

¹ Thus I once heard the following from a distinguished and deeply regretted lecturer: "As Shakespeare says -

"The native hue of resolution

Is—in some way affected—by the pale cast of thought."

² Hence, as Volkmann has shown (*op. cit.* i. 410 ff.), the removal of inhibitions is as potent a factor as direct association. The mythological expression of this truth should not blind us to its importance.

³ *Op. cit.* chap. xvi.

centres active in the thought "of the remembered fact and its "setting" (i.e. date concomitants, etc.) are excited, there is excited along, and in connection with them, a centre which is active in present sensation or the thought of some present fact. It would perhaps seem simplest, for purposes of pure hypothesis, to suggest a difference between centres of thought and centres of feeling. We might suppose a centre of feeling F normally discharging into a centre of thought T, so that the excitement r in T, due to the disturbance S in F, corresponded

always to the primary memory of the sensation S. Now T will be connected with many other centres besides F, and any molecular disturbance coming along a



fibre such as T O will produce excitements in T. These excitements would be of all sorts and kinds. Suppose one of them to have the same form as r . That should correspond to a primary memory. But it will differ in point of its origin, and so will be contrasted with the excitement q at present being propagated in the centre from F, and corresponding to the primary memory of the moment. Thus the thought accompanying r , while a memory, will be contrasted with the primary memories, and its contents will be recognised merely as past. The exacter determination of its date will then depend on the associative awakening of r_1, r_2, r_3 , etc., in connection with r .

Now, without attaching the least importance to the detail of this or any similar hypothesis, what I wish to point out is that the physiological aspect of the subject goes to show that the causes of a remembrance, whatever they are, must be much more varied and subtle than any psychological association. For as soon as we conceive the remembrance as going along with a physiological excitement, we have to admit any cause of such excitement as a possible cause of memory. Now we do not know much of the causes or the nature of molecular changes in the cortex (or elsewhere). But what we do know is decidedly against the association theory. If a centre like T in our diagram stands in multifarious connections with other centres (as, *e.g.*, any pyramidal cell of the cortex is connected by perhaps four fibres or more with other cells, and those cells again are interconnected in endless ramifications); and if, as is probable, a molecular disturbance, beginning at any point of a brain area, will tend, unless inhibited, to propagate itself in all directions indiscriminately, it follows that the state of any one cell is subject to modification by the action of innumerable

others. Then let the excitement r be produced by a molecular force P . Now, whatever systems of forces concentrated on T have a resultant equal to P , will produce the same excitement. And any number of systems, the circumstances being what they are, might have the same resultant. We have no business to limit the reproduction of r to excitement by some associated disturbance r_1 . The waves of excitement which result in r may vary each time r is produced. Causes altogether remote from association, alterations of blood pressure, of nutrition, altered excitability of the tissues, extent to which important paths are occupied by other waves, attitude of attention, and so on, may all of them play their part.¹ In fact, here as elsewhere we are coming to the point where the full complexity of the problem is dawning on us. We have not yet got the answers to many problems of psychology, but we are at least beginning to understand the questions. And it is at this point that we must leave the problem of the psychological explanation of memory.

The results on which we would insist may be summarised in a very few sentences. Memory is an assertion of a past experience, which may be true or false. Whatever its psychological explanation, its validity is one of the ultimate postulates of our knowledge, and must be examined in connection with the validity of our knowledge as a whole. It is not to be explained or justified by "resolving it" into that which it is not.

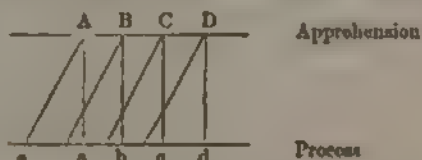
¹ One factor is worth noticing as quasi associative. It often happens that, not having thought of last night's dream all day long, it comes back to you as you lie down in bed again. Here the physical and physiological circumstances are very nearly repeated, and that seems to set the old process going, although your thoughts may be far from the present. You do not follow up a train of thought such as "Bed again—sleep—dream—last night—very uncomfortable—wild bull after me—stopped and said good-morning to him—tall quite polite after all", but skipping all intermediate thought links, you find yourself suddenly picturing a wild bull offering to shake hands, and then remember that you dreamt that last night. The links, therefore, are of physiological character only, and the process is a mimicry of association.

CHAPTER V

CONSTRUCTION

1. CONFINING ourselves strictly to memory as we have defined it, we find only reassertion of that which already has been asserted. But it is easy to see that this does not limit our view of the past. Our actual memory is not of a series of isolated facts, but its content tends to acquire a certain continuity,—a continuity which, *regarded as a whole*, has never been given in apprehension. For example, "it has taken me a long time to write this page," is a memory-judgment in which I review a process of many minutes' duration, and assert it now as forming a whole. We have already seen that in the apprehension of change or continuity the immediately past remains present, and continues to form the content of the apprehending consciousness along with that which succeeds it. But this is not the full explanation of the present phenomenon. Whatever the precise psychological limits of the act of apprehension may be, no one pretends that one and the same fact continues to form the present content of the mind for more than a few seconds from the time of its presentation. Even if the content of apprehension remains qualitatively alike, its early stages become distinguishable from the present as matter of memory. It is clear, then, that we do not apprehend as a whole any fact of many minutes' duration, and therefore in asserting such a whole we are asserting what has not been given, in the form in which it is now asserted, to apprehension. On the other hand, every part of the process so remembered has formed matter of apprehension, though at different times. I do not, I imagine, apprehend a clock striking twelve, i.e. the twelve successive sounds are not simultaneously present to a single act of apprehension. I apprehend each single stroke, however, and the assertion that the clock has struck twelve combines all the apprehended contents into one. Still we have not got an exhaustive account of the matter. If each stroke is a separate isolated datum, how do the twelve get put together? We

want a connecting link, which is supplied by the apprehended succession of the strokes, moment by moment. If the clock strikes with moderate speed, the first stroke is still present to consciousness when the second falls—the actual content of my apprehension should be represented, not as “ting,” but as “ting—pause—ting.” For stroke three the same thing holds, so that I have the actual succession of the twelve given me bit by bit. Consider a more continuous process, say the passage of a cart along the road. Here as the process attended to is less broken, so also is the apprehension. But, as before, consider the apprehending consciousness at any moment subsequent to the first. To that moment of consciousness is present, not a mere point of the process, but an appreciable though short part of it. Take a fresh moment very near the first, its content overlaps the first. We may represent it graphically.



To the apprehension at the point A, *a* is just dying away, and *a* is in the centre of consciousness; at B the process *a b* is fully clear; to C, *b c* is equally clear, but *a* is gone: thus the whole *a b c* is present to the apprehension in its course from A to C, though it is not present to any stage of it as a whole at any one moment. We have already seen in Chapter II. that at each point in the process of apprehension we are aware of a certain section of the process apprehended. We now see that taking two neighbouring stages, their sections, without being identical, will overlap. Hence, if we consider the whole section of apprehension in which the stages are taken, we find that its object will be a continuum reaching from the beginning of the section first present to the end of that presented last. At no single point will this be apprehended as a whole. Yet, when the process is complete, the whole will have been given. It will have been given, not all at once to any single moment of apprehension, but by degrees to successive stages of the apprehending process. Thus in watching a long process we are continuously aware of every part in its continuity with the adjoining parts. We are never aware of the whole as a present fact, but we can assert the whole by a retrospective act which thus brings all the contents given into the compass of a

single assertion. This bringing together we may call memory-synthesis. Notice carefully the extent of its operation. It does not find relations for elements given as unrelated. It does not make a chain out of separate links. Each element is given in its relation to its neighbours, and all that the memory-synthesis does is to take a comprehensive view of the whole which has been thus given bit by bit. Clearly, though, this power of taking comprehensive views is important, since to it memory owes all its "sweep"; by it we know all processes on a large scale, and linking together everything in which we can find any continuity form the idea of the whole series of our past experience, the whole reality that has been actually given to us.¹

2. This memory-synthesis is simply an application to memory of an activity which appears in many different forms, but which always performs the same logical operation. That is to say, it asserts a content never apprehended as a whole, but composed of elements every one of which has been apprehended or otherwise arrived at before its work begins. We must recognise in it a factor of knowledge not reducible to either of the three we have already mentioned; and looking to the relation between its result and its data, we may call it Construction. We shall have to deal with several of its applications in the following chapters. Let us begin with one of the simplest.

We have seen that a resemblance or difference between two facts may be matter of apprehension, that is, supposing the two facts to be given simultaneously. This apprehension of resemblance no more argues any special "comparative" activity of the mind than does the apprehension of any other kind of relation. The resemblance is given like other relations, and there is no ground for the view which some writers² have put

¹ Even our memory of individual facts takes part of its character from an implied memory-synthesis. A fact to be remembered at all must be remembered as part, but its location in the past can only be the vaguest possible as long as it remains isolated. It gets its date by correlation with other contents of memory, i.e. by position in the whole given by memory-synthesis. If the whole is definite and full, its date is precise. If otherwise, it is vague; but even the distinction between "a long time ago" and "recently" implies some knowledge, not merely of the particular event remembered, but of the interval that separates it from the now; and the knowledge of this interval is a summation of particular experiences. Apart from such synthesis all remembered facts would be known simply as "before" the present, not as forming an order or occupying different stages in the "before." Memory-synthesis, then, is a condition of "dated" memory, and precision in dating goes along with completeness of synthesis.

² E.g. Mr Herbert Spencer, *Principles of Psychology*, part vi. chap. xxvii.; cf. Professor Bain in *Mind*, No. lv. p. 372.

forward that likeness and unlikeness are the real forms of the mind,—in fact, it is impossible to hold this view without regarding all relations as of similar origin.

But comparison is possible, not only between given facts, but also between the present and the past, or between two remembered facts. In either of these cases we have a simple construction. A and α being given together, present a certain resemblance. This resemblance is not a separate content different from A and α ; it is not A and it is not α . Nor even is it the whole $A + \alpha$, for in this whole, peculiarities distinguishing A and α will be apparent; but it is a part or an aspect of the whole given content A and α . As such it is given in the apprehension of $A + \alpha$, and it can be distinguished as a character or element of this whole by the analysis of attention. Thus is what happens when we are aware of the present A and α as resembling one another. Now, if A is past and α present, they are not apprehended together; but, when I remember A , I assert it as something I have apprehended, while at the same time I assert α as present. The contents of these two assertions put together construct the whole content A and α , in which a resemblance is a part, related to the whole as before, and detected as before by analysis. What we call comparison, then, that is, a relation of likeness or difference, is known, in the simplest case, by an analysis of the given. In the slightly more complex cases now considered, it is arrived at by analysis of the contents of memory and construction. The result of analysis as applied to these contents is just what it would be if the contents were given instead of being remembered or constructed. This will serve to illustrate an important principle. The factors of knowledge which we have treated in isolation are not normally isolated in their actual working. Analysis, memory, and construction work together on the given. We analyse what we construct, and construct the elements known by analysis; and from such constructions we get the concrete acts of thought with which we are familiar. In short, by this means, so far as memory holds good, we command intellectually the whole of our past experience as though it were now present to us. The forms of thought and knowledge which results from this power will form the subject of the following chapters.

CHAPTER VI

IDEAS

1. IN the first place, what is an idea? The simplest and most natural answer was given by Hume, when he defined it as the "faint copy" or image of an impression. As I watch the snow falling outside, the idea of summer arises by contrast; that is, the impression of sunny skies and singing birds repeats itself faintly for me. It is in quality the same, but fainter; and if I proceed to the thought that summer after all will come again, this *belief* is only a growing strength of the image. Thus the idea is explained as an image, and belief as a kind of idea. Nothing further remains except to deny the possibility of any kind of belief not explicable by this means, i.e. not capable of being represented as a vivid image.

Of course the existence of "images" is a fact; it is also a fact that such images are ordinarily called ideas. To repudiate this usage would be to raise a needless and unwarrantable verbal difficulty. But that an idea is always or as such an image, is a view that need scarcely now be combated. The same instances and the same arguments which we used in the case of memory will apply for the most part here. I have a perfectly clear idea of indigestion, though when well I can image the pain but feebly. Moreover,—and it is on this that I wish to lay most stress,—our ideas are ideas of something; they have a meaning or reference; their interest does not, to adapt Bishop Butler's phrase, "determine upon themselves"; you can ask about an idea, not perhaps whether it is true or false, but certainly whether it is correct or incorrect. In a word, like assertion, it deals with some further reality with which it may or may not correspond. My idea of a balloon, or a sea fight, or a revolution, is something more or less adequate and exact. It is capable of being tested by comparison with reality, and acknowledges the test. No doubt some of these ideas present themselves to me in the garb of images; but even so the mind is aware that they are images, good or bad, of the

reality, and in using them as ideas does not take the images as final; in short, it does not, in employing the idea, mean the image, but the reality. I have in my mind a certain idea or image of a compound engine. This particular engine conforms to that idea, and I judge accordingly, "This is a compound engine." But if I am corrected by someone who knows, I should never dream of defending my statement on the ground that the machine before us corresponded to my idea as I had it. I should admit my statement to be wrong, and wrong because the idea was incorrect. The idea, then, is concerned with a real engine or engines; it does not refer to the image of an engine in my head.

We have compared ideas with assertions; it is perhaps equally legitimate, and certainly more usual, to contrast them. The very point, it is generally held, which marks off an idea from a judgment is that it is not an assertion. "Ghosts do not exist," "There is such a thing as multiple personality"; these are "judgments," assertions, or denials of existence. "Ghosts," "multiple personality"; these are ideas, and anyone may have what ideas he likes, ideas enjoying a liberty not granted to judgment. Similarly, to "have an idea," and to "make an assertion," are distinct states of mind. How, then, can we compare them? Two points will help us. First of all, if it is only a question of having an idea, my state of mind may vary within wide limits. I entertain the idea of a thing equally whether I assert, doubt, or deny, question, wish, or command it. The idea of a fairy, or a genie, or a dragon, is as clear in my mind when I deny their reality, as it is to the child as he reads of Aladdin, or the Princess Peri Banou. You cannot, like the March hare, deny a thing, without knowing what you deny. When you order a mutton chop, you have the idea of it in your mind just as clearly as when you are told it is ready. You cannot even doubt whether $\sqrt{-1}$ has any meaning, without in some degree knowing what $\sqrt{-1}$ means. That I entertain an idea, then, is true of me in many different mental states; that they deal with the same idea is a common character in states otherwise divergent, or even opposed.

Secondly, and conversely, the term idea is not strictly a name for a complete, self-sufficient mental state. I can pronounce single names usually taken to represent "mere" ideas without making them part of a sentence. But if I do so one of three alternatives seems to follow, either (a) the name *pro hac vice* is taken in defiance of grammar to represent a judgment, question, command, or what not. Instances are, "raining," "caught," "beaten," "London." Here the word gives the idea,

and the intonation, or some gesture, or the existing circumstances do the rest, i.e. make of the idea a judgment, wish, or command, as the case may be. Or (b) I am taken, and rightly taken, to be uttering words without meaning, i.e. mere sounds which on other occasions mean something, but for me and my hearers at this moment mean nothing. Or (c) the word is treated as an incomplete expression of a state of mind, and leaves the hearer dissatisfied and expectant.¹ "The right of combination" does not, as it stands, express any actual state of my mind. I may judge it to be a benefit to workmen, wish that it existed in Russia, question whether it can be said to exist in Germany, deny that it existed in England between 1800 and 1824, and so on. All these are or may be actual states of mind. But the idea represented by the words, "right of workmen to combine," while it may enter into all of these states, cannot be a state of mind by itself. The utterance of the words does not imply the existence of such a state, but of one of the others, leaving it uncertain which. Nor does it call such a state into the hearer's mind, but one of the others, though it is again uncertain which.

If this reasoning is correct, "idea," unless it simply means image, is a name, not for any particular kind of mental state, but for the content of mental states of many kinds, as distinguished from the way in which the content is entertained. My idea of a fact is what I assert about it; my idea of a possibility is what I ask; my idea of a desideratum, what I desire or command. Regarded as a mental fact, the idea is an abstraction; it is a part of a psychic whole, which does not exist independently; and from this the important corollary follows that we must determine the nature and meaning of the ideas which we possess from that of our beliefs, wishes, etc., and not *vice versa*. The idea may be the unit of knowledge; but units, it is well to remember, are generally artificial preparations, not data ready to hand.

2. But still two questions remain which may be urged upon us. To begin with, is there not an actual, verifiable state of mind which we call that of merely having an idea, entertaining an idea, or by some such name, the intention of which is to signify that the state in question is neither assertion, nor denial, nor suggestion, nor anything so definite, but merely that of ideation? In this case, then, is not the idea as such an actual state of consciousness? Or if we are able to maintain our first position, and treat the idea as a content, must we not (the second question urges) define this term a little more closely? We will deal with these points side by side. Let us

¹ Cf. Bouanquet's *Logic*, p. 13. My obligations to his whole exposition (Introduction, §§ 2-7, will be obvious throughout.

take an ordinary categorical affirmation about which we have no manner of doubt, and consider the position of the idea contained, "There was a majority of 40 for Home Rule at the General Election of 1892." According to the view here maintained, two elements may be distinguished in my state of mind when I form this judgment. These are (a) the idea employed, (b) the fact that I assert it. We have called the idea the *content* of the assertion, meaning that without it the assertion is nothing, though we distinguish it from the assertiveness of the assertion, because all manner of different contents can equally well be asserted; and, on the other hand, this very same content can equally well enter into a question, doubt, or denial, according to the state of our knowledge. But, now, can we say anything more definite; can we define the content of an assertion? With regard to the affirmation as a whole, it is clearly a reference to a reality, to a reality which is past and distinct from the asserting consciousness. Can we now go a step further, and include this reference in the content? Can we say that the content is itself a reference to reality which we may affirm, doubt, or deny, as the case may be? So long as we confine ourselves to affirmation we get on very well, for the object of reference (in our example, the Home Rule majority of 40) is taken as real. There seems accordingly no difficulty in saying, here is a fact known once for all. At any subsequent time we may refer to this fact. This reference is an idea, and making the reference we call "having" or "entertaining" the idea, thinking about the fact. There is no difficulty in speaking of a reference, for there is something which refers, and something which is referred to. And we may proceed to distinguish the more reference from the assertion of the fact, which we may say simply adds to the reference the element of intellectual acceptance.¹ The idea, one may put it, is maintained (as against a doubt or a question) by an act of assertion or judgment. The reference to reality is common to both, and there is nothing between them psychologically regarded but this element of assertiveness.

This solution is not so simple when we turn to question or denial. For in these cases it is precisely the existence of the object referred to which is doubted or denied; and how can there be an act of reference, unless there is something to which the act refers? If I say, "The Manchester school no longer exists," or, "there are no Freisinnige in the new Reichstag," can I be said to refer to reality, seeing that the purport of the

¹ Brentano's *Anerkennung*. See Hillebrand, *Neuen Theorien der kategorischen Schlüsse*, c. ii.

remark is to deny that there is any such reality to refer to? There is still one resource. You may say, "The reference here is to the Manchester school, or to the Freisinnige party," both of which ~~were~~ realities, belong, that is, to the total system of reality, which is not limited by the mere present. Referring to them, and again to some further reality, which in the first case we may take as "the present condition of political opinion," or in the second as the constitution of the present Reichstag, our assertion is that the two realities are incompatible or mutually exclusive. There is, then, a reference to reality; but the reality in question in its full analysis is the incompatibility of one set of existing facts with another set which have existed.

But there are other instances in which this will hardly avail us. Take the case of error. "The soul is a thin gaseous substance which leaves the body with the last breath." Here the soul is doubtless a reality; but where or what is the substance in question, and if it does not exist, to what does the idea of it refer? "Phlogiston is the heat-producing substance." Where is the reality with which this statement is concerned? It may be said that these ideas, fictitious in a sense, have a reference like centaurs or dragons. That Polyphemus came near to destroying Odysseus is true in a sense. It is true, that is, that Homer sang of it, and perhaps believed it; and when you or I speak of Cyclops, of sirens and centaurs, we know what we mean. We refer to the world of Homer, the world where Odysseus planned, and Achilles fought, and Penelope wove,—a world of spoken or written words, of sculptured marble, of long past thought, all of them realities after their kind. But, then, when we speak of these things in this way, we no longer suppose ourselves to be in error; and it is error which is question. If Homer really thought the sirens existed, to what did Homer refer, and when we nowadays entertain erroneous ideas, to what reality are these ideas related?

It may, indeed, be said that the sirens were supposed to exist in the real world. The idea of them referred to reality as the whole in which everything that is real must be found. And in this sense there can be no objection to describing an idea as a content referred to reality. But the reality now referred to is not a real fact indicated by the idea itself. My idea of a dog refers to the real living animal; my idea of a centaur refers to a real world in which, in point of fact, the combination of horse and man is not found. Hence, from the logical point of view, states of mind in which we "entertain an idea" may be of two very distinct classes. Either we may be

referring to, thinking of, a reality which in the back of our minds we know to exist, as when I think over the events of the day, or pass leisurely over the incidents of a novel or history lately read. In this sense the mere having the idea postulates *logically* a categorical judgment into which the idea enters as content; and it is only on the strength of such a postulate that we can venture to speak of the entertainment of the idea as an act of reference. If we drop the postulate we come to the second case, where the idea is really a suggestion. Differing from assertion in point of its assertiveness, it still looks out towards a world beyond itself; and if it does not *claim* that anything in this wider reality corresponds with it, it will still acknowledge itself as affirmed or denied, accepted or rejected, by a comparison with reality as subsequently given. Merely to have or entertain an idea is, if we tacitly postulate nothing more on the subject, the same thing as merely to suggest. One further point will clear this up, and also enable us to bring both cases into relation. Assertion (we may be allowed to assume here, though the point will need further argument in support of it) may have every degree of modal strength from certainty to the zero of pure doubt. The thought which merely entertains an idea, we may say, occupies no defined place in this scale. It is a judgment of undefined modality; in forming it we have not even committed ourselves to a preference for or against its truth. And this will relieve us of a difficulty. A suggestion definitely adopted as a problematic judgment is thereby as definitely distinguished from an assertorical. The problematic judgment declares its content to be possible but uncertain; it distinguishes it from the content of the assertorical. But when the idea we entertain is a reference to a known reality, we cannot say that it is uncertain. As a mental fact our certainty of it is in abeyance; but we do not, on that account, entertain a definite doubt on the point. We may take it, then, that the mental state called having an idea, is that of suggesting a content of reality without determining or being conscious of any degree of certainty as to the truth of the suggestion. The term "idea"¹ can thus be applied to any content that may be asserted or suggested as real; and in this meaning a "reference to reality" in one sense is included. For if reality means the whole within which every-

¹ As a verbal point, it should be noted that I have here used "idea" where, e.g., Mr. Bradley would employ the term "ideal content." That is, I have used the term idea, not to denote any state of mind, but always the content entertained in some state. Mr. Bradley's usage has the advantage of avoiding one confusion at least, and I shall employ it whenever it seems specially to be feared that that confusion might otherwise occur.

thing real is found, it is clear that to *this* reality every assertion and every suggestion refers. The idea, then, is a content referred to reality; and to entertain an idea is to make a mental reference to reality. But this reference must be entertained in some definite fashion, whether as the content of command, wish, assertion, or suggestion. Excluding, then, every implication of further thoughts, we find that to entertain an idea is to suggest a content of reality. Lastly, what differentiates the idea from other contents of assertion or suggestion is, that it is not merely suggested of reality, but has become known as a content so suggested, that is, as a part of your mental world or mine. Not only is it referred to reality, but it is itself an object referred to; and, in fact, the part it plays in our thought is due to this double character.

3. The idea as thus defined is logically contrasted, but in fact perplexingly interchangeable with the idea as image. The very same content which I suggest or assert or deny of reality I may, in many cases, take simply as so much present fact. My mental picture of the Forum of Rome is something that I can call up at pleasure, something which, faint though it be, is clear and distinct almost as my perception of it as I explored it; something which I can even examine and analyse, as, for example, to assure myself of the relative positions of its temples or the line of the Sacred Way, which, in short, fulfils all the functions of an ordinary presented content. All this I can present to myself without judging or suggesting anything. I simply see the whole thing, and I assert for the moment nothing but what is present to the mind's eye. At the same time the whole, or any portion, of this content can be transformed into a judgment. My mental vision, say, of the Sacred Way running past the Basilica Julia and curving to the right round the Temple of Saturn is transformed, in answer, perhaps, to a question, into "the Sacred Way runs," etc. Whether all ideas can thus serve as simply presented facts, is a difficult question which we may leave untouched. All ideas of concrete things, events, and the like, appear to have this capacity; while the same is true of abstract ideas, at least so far as they are symbolised by concrete representative images. We are forced, then, to distinguish two usages of the idea—(a) as the content of a suggestion, etc., and (b) as a presented fact without reference to a further reality. The point of identity is that in the second usage the idea "really" refers to something further, inasmuch as it is formed from perception, and can always be used to represent the perceived object; but so far as this usage is in abeyance, the idea falls into the second class.

CHAPTER VII

GENERAL IDEAS

1. RETURNING to the usage of ideas as contents of assertion or suggestion, we have to ask now what they contain. Clearly, from our definition, whatever can be asserted or even suggested of reality, can be the content of an idea, and becomes such when not merely asserted, but also referred to as the content of an assertion. It is usual to divide our assertions into Particular or General, and ideas will accordingly fall under the same heads. Ideas of particular facts will be simply the content of our ordinary memories, and constructions of memories, and their nature and genesis need not therefore give us any further difficulty. We need only remark a difference between the idea of a strictly particular fact and that of an individual person or thing. The particular fact may, at least, be given in a single act of apprehension. The individual person or thing is certainly a content involving many apprehended data, and we shall see later that the mere construction of these data is insufficient without inference to explain all that we actually mean by ideas of this class. It will be sufficient for the present to indicate that these ideas refer to special wholes of facts connected each by its own appropriate nexus in a manner that will demand description later on.

Passing to general ideas, and treating them as the contents of a suggestion, the question is, What do they suggest? The answer is to be found by stating the suggestion in full, or, if you prefer, turning it into an assertion. Turn "ghost" into an assertion, and it is "ghosts exist," "there are ghosts." When, where? The judgment does not particularise, only somewhere. There is nothing as yet in the judgment about graveyards and midnight. What is a ghost? For our purposes it is a *general content*, that is, something common, or taken as common, to many apprehended or apprehensible facts, a point in which those facts are judged similar. It is not a particular content, something that was apprehended once for all, and now alluded to as "that ghost." Accordingly, the idea of ghosts means a

content common to several facts supposed to be apprehended or apprehensible, without specifying what facts.

Now we have seen reason to believe that memory, properly considered, gives us a very definite assertion. It speaks of *that* cold I caught, *that* time we rowed down the Wye, three years ago. It deals with an individual fact, and particularizes its content. But though memory wishes to be definite, it cannot always become so. Its contents get blurred, their angles get rubbed off, their joints and links of communication with surrounding facts get loosened. In a word, the remembered content tends to lose its definiteness, both of quality and of position. It becomes now not that thing done then, but a thing done some time. The date loses its relation to other events, and turns into a cold, experienced some time. Memory, then, in its weaker forms makes assertions with the same indefiniteness of position that we find in a general content. The remembered fact is simply located somewhere in the past, just as the general content is located somewhere in reality.

It would be a mistake to conclude that a general idea is simply a blurred and degenerate memory. Memory, however it may fail, still means to recall a particular existence, while in the ideas before us generality is definitely substituted for such existence. To explain generality, we must revert to comparison. Comparison we have seen to be the knowledge of likeness or difference, whether this be directly given by analysis or more indirectly by construction. Whether a comparison be "given" or "constructed" it is in its simplest form an assertion of a relation only, a likeness between two given facts. In the crudest kind of comparison, two apprehended data A and α are related just as they were given, and are held to be more or less alike. A further step is taken when analysis is brought into play. A is broken up into p , q , r , and α into p , s , t , and a more definite relation of precise likeness or identity is asserted between the p in the A and the p in α . Now this identity is still a mere relation: " $p=p$ " is a simple relation, just as much as " A is like α ."¹ But in dealing with analytic attention, we pointed out that the mind in exercising it can remain quite distinctly aware of the whole that it is analysing, and of the relation of the part to the whole—so far, at least, as to apprehend that the part attended to goes to constitute the whole. Now, when such acts of analytic attention are combined with a comparison, we get a result which we may call a defined and analysed comparison, A is like α , because they are identical in p ; and there emerges

¹ See below, Chap. VIII.

along with this the converse judgment that *p* is identical in *A* and in *a*. In *p*, then, the mind becomes aware of a content which may be common to more than one fact, or, strictly speaking, such that it occurs twice, as an element in different facts. Now, let *p* be oftener repeated, and let memory lose sight of *A* and *a*, etc., the individual instances in which it appeared, and all we retain is the assertion of *p* as having qualified several apprehended facts. We have not only the vagueness of position (which we found in degenerate memory), but also the definiteness of generality which we get from analytic comparison.¹

One further step can, I think, be differentiated in the process of forming the idea. The memory-content, which loses definiteness of position, is left, as it were, isolated. There is distinctly less in the assertion than in a definite memory, and there is the feeling of a void. But while we acquire the notion of contents common to several given facts, we also, by the synthesis of memory, are building up the series of past experiences into a single whole, the order of reality as it has been presented to us. It is of this reality that the ideal content is now asserted. It has qualified facts within the given series; while the particularity and definiteness of these facts is dropped out of sight, the wider reality in which they were given takes their place, and it is asserted of the ideal content that it has qualified reality. This attribution gives its existence all the definiteness which is required in the case of an idea, that is to say, not individuality, but a certain connection between its manifold appearances, consisting in this, that they are all found within one and the same system of existent facts. To say this is not enough to individualise a fact, and, therefore, indefinite memory would not regain its precision by asserting its content "of reality." It is, however, enough to define the existence of a general fact.

Our first formation of a general idea appears therefore to

¹ We have spoken here as though analysis were conscious and purposive. This is rather the logical exposition of what is implied in forming ideas, than a psychological description of what always takes place. Dr. Ward has a right to protest that "thinking does not begin with a conscious abstraction of attention from recognised differences. . . . The same name is applied to different things or events because only their more salient features are perceived at all" (*Essay, Brit. art. "Psychology,"* p. 71). Of course, if the common *p* is found without analysis, so much the more easily will the idea of *p* be formed. All we require is that the idea may be based on a mere element of the given, and that in the higher stages of consciousness we can be aware of it as an element. The same result is arrived at, doubtless, by the mind in many instances by a shorter and less logical road. The involuntary restriction of attention to "salient" features may have the same results as a conscious analysis, though it is only the conscious analysis which could justify those results.

rest on a particular combination of the mental activities already specified. We detect the similar content p in two given facts, A and a , and the generality of p means primarily that it is found more than once, or, if you like, that two or more similar facts are found, qualifying different objects of our perception. This similarity of content, qualifying facts differing numerically or otherwise, is the centre of the general idea. As long as the mind has before it the whole " p , qualifying both A and a ," it is making a comparative judgment, in which an ideal content is contained. Dropping A and a out of sight, and substituting for them reality as a given whole, as the field in which p 's existence is to be found, we have the idea of p isolated; that is, we have the suggestion, assertion, thought (call it which you please) of a content common to different portions of reality.

In this definition of the general idea the number of times p is repeated is left indefinite. This indefiniteness naturally follows on the dropping of the individual facts A and a . The number of p 's then becomes, *co ipso*, indefinite. But in our ideas as we have them, there would seem to be implied a more definite notion of generality, that is, a suggestion that p not only has been found a certain number of times, but will or may be found many times more. Such an idea would certainly contain within it a trace of inference, of generalisation from what has been to what may be. For, in the first place, the conception of a reality, extending beyond the series of experienced facts, is in itself, strictly speaking, inferential. And, in the second place, when the idea is properly and strictly general, it is suggested of this wider reality as something that may be realised again, just as it has been realised already. To frame a general idea is thus to suggest that a content exists an indefinite number of times at an indefinite number of points in reality.

2. Generality then, on our account, if taken strictly, involves number, but indefinite number. It involves plurality, because it is based upon comparison; and comparison necessitates at least two instances. But the number is indefinite, because there is nothing in the results of comparison to indicate how many instances must, or how many can, resemble one another.

This irrelevance of the number of instances is what is meant by such tautologies as that " p will still be p wherever we find it." The meaning, in fact, is, that p being a general content, may be found in an indefinite number of cases; or if you prefer it, that since in framing the idea of p I suggest it, not as existing in this or that case, but as a content qualifying reality in various parts, the particular position, number, and

remaining character of those parts does not affect the value of the suggestion, nor the character of the contents suggested.

On the other hand, some plurality seems essential to the general content. If we take *A* and deny that it can exist in any case but one, it becomes, *ipso facto*, an individual. It does not cease on this account to have character or content. But this character is no longer general. It is unique. It can be apprehended, analysed, remembered, thought of, referred to, even named, but it cannot be the content of a general idea. We may have an idea of it, but an idea that is particular and not general.

It may be objected, that we do not ordinarily think of a number of instances when we use a general idea. When we discuss constitutional government, or electricity, or picturesqueness, we are not concerned with the particular nations which are constitutionally governed, or the extent to which electricity is diffused in the material universe, or the number of scenes in existence which might be described as picturesque. We are thinking of a certain character of some reality or other, the number of repetitions of that character in reality being irrelevant. We refer this character to reality, but not to any number of cases in reality. And this analysis might be reinforced by special instances. For it might be said we use contents undoubtedly individual in their origin as general ideas. Thus we speak of a Daniel, a Croesus, another 2nd of December. Or we form from our one known sun the idea of "a sun," and so have no difficulty in thinking of other stars as centres of solar systems. Contents of this kind, undoubtedly in some sense general, suggest an objection to our whole account. If here we get general ideas without comparison, why not in other cases as well?¹ To answer this we must understand how far the contents just taken are really general in character, and we must be quite clear as to what we mean by generality.

If we adhere to the definition of a general idea laid down at the beginning of this discussion, we must admit that plurality of instances must be one of its essentials. The general content must be common to at least two instances in reality. Now, so long as a given content *q* is unique, however much we detach it from its surroundings and isolate it in thought, we can only treat it as general on the analogy of known cases of general contents. If *n o p* are known to exist each in many cases, this experience suggests that the

¹ Cf. Sigwart, *Logik*, sec. 7. The essence of Sigwart's contention will, I think, be seen to be provided for in our account.

same may hold for *q*. And to treat *q* explicitly as a general content is simply to hold this possibility in mind; that is, to regard *q* as a content which may be general, just as certain known contents are general. Explicit generality, we may therefore say, is based directly or indirectly on comparison of instances.

But there is another point. The meaning of an idea may be explicit and ambiguous. Let us see how this comes about. If we treat *q* as a general content, to appear in fresh cases, *q* must first be detached in the manner already indicated from the instance in which it is given. By an act of analysis or abstraction we must assert *q* in separation from its particular context as an attribute simply of reality. Now, if we rest at this point, we have an ideal content, which, if taken strictly, is neither general nor individual. It is not fully individual, because it is referred to reality at large, and not to its own particular context. It is not general, because it is not suggested as qualifying reality in many cases, or as a basis of resemblance between different points of reality. It is, in short, indeterminate. Nothing in the idea at this stage decides whether it is a reference to "*the q*," or to "*q*." This indeterminate idea, then, is not more, but less, than the individual, not richer, but poorer. For the notion of definite position or context is dropped, and nothing is gained in return. In the general idea, on the other hand, there is a compensatory notion derived from comparison, the notion of number of instances presenting points of resemblance.

Now ideas, as they pass through our heads, are mainly of the indeterminate order. Even if they have been derived from comparison, we do not put ourselves to the trouble of realising their general character. The notion of generality lies ready to hand, to fill up their meaning as soon as thought requires it; but we do not always use it.

On the other hand, it makes the greatest difference whether the content of an idea is, in fact, general or not. The content which we entertain in this indeterminate fashion may be, in fact, applicable to many cases in reality, and we ourselves may at different times apply it in different contexts. Such a content, we may say, is *de facto* general—it is *de facto* used as general—even though we may never at any moment explicitly assert its generality. On the other hand, it is *de facto* individual if it can only be realised in a single case, and we may be aware of this limitation without always referring to it whenever we employ the idea.

Ideas, then, are individual, indeterminate, or general. The

individual idea is a suggestion of some definite set of facts occupying some continuous portion of reality; such are our ideas of Themistocles, Jack the Giant-killer, or Utopia. An indeterminate idea is a content attributed to reality at large, not to any particular part of it. Whether it exists once or many times is not stated or implied; its individuality is ignored, and that is all; such, ordinarily, is our idea of the romantic. A general idea is a content suggested as existing many times in reality, as qualifying reality at many points, constituting a resemblance between those parts of reality which contain it. Such is my idea of a horse or a mill, or, broadly, of a genus containing species, or a species containing individuals. The indeterminate idea is *de facto* general, if it is on various occasions applied to distinct individual cases. Lastly, as indeterminate a content may depend merely on abstraction; as general it directly or indirectly involves comparison.

3. The numerical plurality which we take to be necessary to a general content may be held to involve, as a rule, some qualitative, i.e. specific, difference. But this is not universal. There may be true *infima species*, and an *infima species* is still a general. Thus an exactly similar shade of colour may be produced in two ribbons; two notes may be qualitatively indistinguishable, two figures exactly equal in every side and angle.¹ Their character is still general; it is a content appearing in different instances. More often the difference of context in greater or less degree affects the character of the ideal content itself. Thus red, we may say, is a very different red in crimson and in scarlet. Humanity seems to be one thing in Shakespeare and quite another in a Hottentot. Still, if red or humanity are *bond fide* general ideas at all, they must have some definite and constant meaning. They must suggest some character or other, and it is only this character which really belongs to the general idea as such; conversely, in what special form the character will appear, is not determined by the assertion of the general content as such. In this sense, then, we must contrast the generic content with its specific form, just as we contrast the specific content with its context. Only we must bear in mind that the "forms" in question qualify the general content in a special way, the logical significance of which we must consider later.² For the present we may treat all difference as a matter of context.

The question may be raised, whether we can carry

¹ Certain difficulties connected with the conception of an "absolute" exactness are discussed below, Chap. VIII.

² Chap. VIII. p. 114.

abstraction a point further than has yet been done. We have spoken of ignoring the individual existence of a fact, and have treated this as a kind of analysis which simply separates off the fact in question from its surroundings, while we have supposed the fact itself to be still asserted of reality. Can we now go a step further and abstract the nature of the content from its existence altogether, its "what-ness" from its "that-ness"? Only, if our foregoing account is correct, at the cost of reducing our content to a merely presented psychical datum, without meaning or reference to further reality. There seems to be no mean between these extremes. Either a content is suggested of reality (whether with or without definition of where and when), or it is a merely present fact. If this is false, we must find some new meaning for the idea as a mental fact. If it is the content of a suggestion or assertion, how can it be suggested or asserted but of reality? How, again, can we "mean" anything unless we suggest that thing? and how can we suggest it unless we suppose for it a place in the real world?

I conclude that an explicitly general idea is a content found, or supposed to exist, in several instances within the real world, and that our conception of such a content depends on memory, analysis, and comparison. An indeterminately general content is one which is so separated by analytic attention from its individual setting as to be considered simply as a character existing in reality: such a content does not necessarily involve comparison¹ unless or until it is used as general.

¹ The old-fashioned view, which is in the main that of the text, that abstraction (analysis) and comparison are the two main elements in the first formation of ideas, has been attacked by various writers, but no really vital objection has been brought against it, still less has any possible alternative theory been put forward. Lotze (*Logic*, bk. i. chap. i. § 23) argues that, while "gold, silver, copper, and lead differ in colour, brilliancy, weight, and density," we do not find their "universal" metal "by simply leaving out these differences without compensation." But what is the "compensation"? To our surprise, we find a little lower down that "compensation, by the corresponding universal for omission of the individual marks, is the regular rule of abstraction," i.e. for the particular weight or brilliancy of gold we substitute some more generic conception in the concept metal. But this is precisely the abstraction-theory. Differences of weight or brilliancy are left out of account; common-characters are retained. There is no substitution or compensation, but simply retention of a partial character. No defender of the abstraction theory ever supposed that "weight" would be left altogether out of our conception of things, all of which are heavy, but in different degrees. This would be directly opposed to the whole method. Sigwart (*Logic*, §§ 7 and 40) is more nearly in agreement with the account in the text, which, in fact, owes much to his discussion. He denies, however (e.g. vol. i. § 7, 2nd ed. p. 59, cf. p. 322), that the "capacity of an idea for being general" depends on its being derived from a number of individual ideas. Our account admits this, so far as any given idea

4. Further questions as to the nature of general ideas belong really to psychology. To logic they are important only as bearing on the nature and basis of assertions. How we come to know or believe at all remains an ultimate puzzle, for logic as for psychology, but it is a fact which must be assumed before logic can begin. Once assuming this fact, the question is, what we believe, why we believe it, and whether we can justify our belief; and so far as the prior two of these questions are concerned, we have tried to give some account of general ideas in the preceding paragraphs. The third question, as to logical justification, must occupy us later on; but all three are totally distinct from a fourth difficulty, which has sometimes been regarded as the point of controversy with regard to general ideas, and which must indeed remain a question of vital interest to psychology. I mean the question, What is the nature of the psychical state when a general idea is formed? This logic need not attempt to decide any more than it is bound to describe the nature of any assertion, belief, or disbelief, as a mental fact. Granting assertions, we wish, as logicians, to know, not what they are as psychical events, but what they assert, and why. If their psychical nature from time to time concerns us, it is merely as illustrating, enforcing, or indicating some logical distinction. It is sufficient, therefore, to suggest, in a few words, the easiest way of conceiving general ideas as events within the mind. Images as such they clearly are not. Berkeley showed, once for all, that a generality is not capable of being represented as an individual. It does not follow, as has been shown since Berkeley, that an image may not be used in the formation of a general idea. And we may add, that a series of images may sometimes be necessary. If I take my image of a billiard ball, and attend only to the outline at right angles to the line of vision, I get the idea of a circle. I cannot see the circle separately, but I can fix attention on it and distinguish it analytically from other characters. If I compare this circle with my image of a water-wheel, and "fix" the common

is concerned. On our view, it is comparison which gives meaning to generality as such, and certain contents once being known as general, any content may be treated as such. A content may be given only once, it may be the product of analysis without comparison; it may even be independent of analysis, i.e. be a whole datum of apprehension. But its "generality" means that that is suggested of it which has been found in other cases by comparison. Sigwart seems to admit the essence of our notion of generality (§ 7, *loc. cit.*): "It lies not in the special nature or origin of that which is represented . . . but in this, that the idea (*Vorstellung*) is actually applied to a plurality of individual contents of perception (*Einzelanschauungen*), and that this plurality as such comes into consideration."

element, I get the notion of pure circularity independent of size. The psychological process corresponds point for point with the logical, except in this, that the irrelevant matter is never eliminated. The extraneous characteristics of the image remain, however much we determine to "mean" only one element in it and to ignore the rest.¹ The same process seems to go on in the most abstract or complicated cases. A "law" or "formula," say of some quantitative variation, can be represented by "taking" mentally two or three cases, representing, if possible, widely divergent instances, and realising the formula in such instances. Thus, I might realise Boyle's law and its limitations by observing or thinking of an actual volume of gas under three or four different amounts of pressure. Better still, I may take an actual process representing the working out of the formula amid progressive change of quantitative values. Thus we may illustrate the effect on prices of reduced supply with nearly constant demand by the gradual rise in prices during the great coal lock-out of 1893.²

To representation by partially irrelevant images there would seem to be only one alternative—symbolism. A symbol is a content with a definite character of its own, taken as representing some other content which it may not in the least resemble. I have not called an idea a symbol, because whatever facts are symbolic are made so by ideas. The idea is not something which I put up to act as a substitute for my representation of reality. It is my representation of reality. We should never speak of representing facts by means of or through ideas. Our representation of them is an idea. It is a fatal error in philosophy to take the idea as a third something that comes between the mind and reality. But this third something is precisely what a symbol is. It is substituted by the mind, on various accounts, for the direct representation of the fact. The most important case of symbolism is, of course, language spoken or written. We may refer also to arithmetic, algebra, and the "graphic method" in physiology or social science. The lines by which Mr. Charles Booth represents the fluctuations of employment at the London docks, the curves by which Jevons or Professor Marshall illustrates the dependence of value on demand and supply, are simply well-adapted methods of symbolism. I would call special attention to these instances. We have said above that

¹ Attention, as Höffding puts it (*Outlines*, p. 169), is concentrated on the required elements, and a "weaker light" falls on the others.

² With our whole account of Berkeley, *Principles of Human Knowledge*, introd. §§ 15, 16.

the symbol need not resemble that which it represents. But in the most fruitful kinds of symbolism (apart from that which serves human intercourse) there is also a definitely conceived correspondence of what we may call homologous points in the symbol and the thing symbolised. This is best instanced, again, in the graphic method, where each section of an ordinate or abscissa has its definite meaning in quantity and quality. Complex relations of value to demand and supply can be expressed by a curve, precisely because each variation in the line is understood to correspond, in length and in direction, with a distinct variation in the factors symbolised and in their result. The case of algebra might seem an exception, since its symbols (A , B , C , $+$, $-$) have the very barest resemblance¹ to anything they may symbolise. But it is precisely this bareness which algebra requires. It wants to deal with pure quantity, and even with pure and abstract relations of quantity (as against particular numbers). In carrying this out any concreteness in the symbols used would confuse it. It uses, accordingly, symbols which suggest nothing beyond that which it is conventionally understood that they are to signify.

As mental states, then, ideas are either analysed images or symbols. Is this division final, or must all symbols be resolvable, translatable at will, into representative images? Here, again, the psychological question becomes important for logic in relation to particular cases of belief. But the question is rather one that demands special treatment in each case. All that I would venture to suggest, in general, is this. Every object of belief must be either representable (by combination and analysis of images) or be taken as analogous, i.e. in some degree similar to a representable content. Thus, in mathematics, imaginary quantities or figures (which are an extreme case, since, as represented, they would be sheer self-contradictions) are formed on the analogy of real quantities. The indefinite production of the asymptote is a simple extension of its character for any given finite length. $\sqrt{-a}$ is no representable quantity, but an expression formed analogically from \sqrt{a} ; it is, I suppose, such a quantity as should stand to $-a$ in the relation which \sqrt{a} occupies to a . Further, beliefs or ideas may be very indefinite. As we try to fix them they elude our

¹ It is perhaps truer to say "no resemblance at all." Of course, letters are so much black ink or so much sound, and in that sense quantity. But in the same sense they are also particular quantities, and algebra does not use them as such. As meant in algebra, they are to be compared rather to marks put on a bale of goods. They are treated as being nothing but standing each for its own quantity.

grasp. We mean something, but barely know what we do mean. To overlook the immense importance of such half-meanings, the only rays of light which reach us from some far distant regions, is a fatal blindness. It is (if I may use the expression) the scientific fallacy. If symbolism helps us to fix them, symbolism is justified of its results. But even here we must bear in mind, first, that there must be the genuine ideas in the background, however indefinite it be; and, secondly, that, in fact, the symbol has too often played the cuckoo's part and substituted its bastard self for the offspring from on high. Lastly, to develop such ideas on the analogy of symbols, to infer that such and such things being true of the symbol, similar consequences (however vaguely similar) must hold for the thing symbolised, is always dangerous, and can never be warranted except by special experience.¹ We may conclude that, directly or indirectly, any content of belief must be representable by means of images, or must be analogous to one so representable.

5 We have already spoken of language as a form of symbolism. Some difficulty was at one time raised as to what is symbolised. Clearly, in a sense the name or word which I utter is a sign of my idea. I cry "wolf" because I have seen, or fancy I have seen, one; and all the word primarily indicates is my perception, real or imagined; the presence of the actual wolf may be regarded as being, for my hearer, a further absence. But this is taking "sign" in the sense in which it is not equivalent to symbol. The name is the sign of the idea, as any effect is a sign (*σημειον*) of its cause. It does not symbolise the idea in the sense of being something devised by the mind to stand for the idea. As a symbol it stands for the reality, the very same reality to which the idea which uses the symbol itself refers.² Names regarded as symbols are, as Mill showed, names of things, not of our ideas of things.

Taking names as symbols that "stand for" reality, a word must be added on the logical postulates of such symbolism. Language in its origin in the individual is, I suppose, reflex, automatic, and unconscious. It is a purely physiological process. Certain mental states act on the motor nerves of the tongue and larynx, just as others act on the vasomotor nerves of the lachrymal or sweat-glands. Certain modes of conscious-

¹ The fact that in mathematics calculation by imaginary quantities gives results which harmonise with those obtained, more circuitously, from "real" quantities is, I imagine, the justification of their employment.

² A reality, of course, may happen to be the speaker's mental state, but this possibility can scarcely cause confusion.

ness result in cries or exclamations, just as others (or even the very same modes) produce blushes or pallor, tears or perspiration. Not only the primitive babblings of the infant, but the ordinary unreflecting speech of the adult, is thus mechanical in its mode of production. But the organisation of symbolic speech as a method of communication involves more complicated conditions. For this purpose it is clear that every symbol used must be a fixed sound attached to a fixed and distinct content as such, and that by all the individuals for whom it is to serve as a method of communication. Until this fixity of reference is attained there is no human speech in the proper sense of that term. The cries of an animal are significant in one sense, in that we have good grounds in observation for taking them as the effects, and therefore signs, of certain feelings or dispositions. But they are not significant as symbols except in so far as the animal purposely uses them as such. How far this may be done by animals is a question we may leave untouched at present. In the case of human beings, attentive observation may reveal the transition actually taking place. The child is loosely said to "speak" when it cries Mam, mam, mam, without meaning anything whatever. This is interjection, not symbolic exclamation. The same sounds when uttered only at the sight or in felt want of its mother become fixed symbols referred to a fixed content, i.e. significant speech.

This fixation of meaning is, logically speaking, of the nature of an inference. When I learn that *Begriff* means a concept, or *homo* a man, I make a kind of generalisation which I have to apply in particular cases; i.e. I learn that if I want to express the term concept to a German I must use the word *Begriff*, or if, in reading *Livy*, I meet the word *homo*, I am to understand "man." This we shall see to be a true inference; and in the case of an adult learning a foreign language it is almost all an explicit process consciously gone through. In the first acquisition of language by a child the conscious process is, of course, far cruder; but even then we must admit the operation of the same connections of symbol and meaning on the infantile mind. Of course a baby does not syllogise, but (so far as he learns to speak correctly) the same facts influence him as if he syllogised. He does not say to himself, "I called this person Mam, mam yesterday (with beneficial results), and therefore will do the same again to-day." But the fact that he has once affixed the symbol to the content, operates upon him in such a way as to make him retain that symbol for that content.

Now this movement of thought which connects contents

universally, we shall see later to be the fundamental fact in inference. Where such an act takes place in thinking, there is conscious inference; where a mind arrives at results by different mental or brain processes which can only be justified by such a movement of thought, there we speak of an implied inference. Explicitly or implicitly, therefore, language embodies the results of a system of inferences.

The spoken word or sentence becomes in this way a medium between speaker and hearer. The hearer draws an inference from the word to the fact, the speaker from the fact to the word. Confining ourselves to the speaker, and omitting purely reflex exclamations, and lies, commands, wishes, etc., we can see that the content symbolised must be simultaneously in some way asserted, believed, or suggested by him. This assertion, or whatever it be, we call the "mental equivalent" of the spoken sentence. We might almost regard it as the premises of which the utterance is a conclusion, since the appropriateness of the language used to "express" the object asserted involves, as we have seen, a special inference on its own account. This step taken in speech is common to every spoken sentence, and we may therefore distinguish it in thought from the belief which forms its basis, and to which it gives expression. Now, no mental state is itself a proposition, nor does it issue in a proposition without the concurrence of the inferential process just described. But certain mental states require something more than this before they can be, properly speaking, expressed by language, while others require nothing further. Such latter states we may describe as being directly expressible in language, or as being the proximate mental basis of the proposition.

6. From what has been said of the logic of language or any symbolism used for communication, it will be readily clear that the only contents "directly expressible" by words must be such as are common to the experience both of speaker and hearer. To assist in communication, any given symbol must mean the same thing for both speaker and hearer, and the same thing always. It is easy, then, to see that the bulk of our communications must take place by means of general ideas, and that words for the most part "express" such ideas directly, while particular experiences are expressible only by being brought into relation with some general content. Thus the mass of language, adverbs and conjunctions no less than substantives and verbs, is general in character. It is true that by gestures we can communicate what we immediately perceive, and direct another's attention to the same object. But whether we use speech or writing or gesture, it is difficult to see how

we could get beyond the communication of immediately present facts to others so situated as to be able to present the very same facts to themselves, except by the means of contents common to many parts of our experience, and designated each by its own symbol. When a child sees a horse for the first time it will draw attention to it by pointing; but if it sees the horse while alone, it cannot tell what it has seen unless it possesses sufficient language and power of seizing and describing general characteristics. We may take it, then, that language is the symbol of a system of contents common to many parts of experience, and for the most part truly general in character.¹ We may also notice, in conclusion, that just as ideas may not be always accurate, so words are confessedly inadequate exponents of ideas. You have a correct idea, but you express yourself oddly, loosely, inaccurately. Thus even in a single proposition the inference already noted as involved in the application of the name may not always be accurately performed, and in arguing from the sentence to its mental basis we are assuming a correspondence which does not always exist. And in this connection we may note a special difficulty in the formulation

¹ Proper names alone designate contents common to many parts of experience which are not truly general. They indicate things, or persons, which are individual, and so far opposed to what is general. But, of course, the individual is characterized by certain definite recognizable attributes—he is not a subject without attributes. And, if a true individual, he persists through or reappears in many experiences, and is an object of your experience as well as mine. "London" or "John Jones" are to me (apart from inferences) names for tolerably constant characters appearing at intervals under certain conditions. No doubt I regard these characters as interconnected in a special way which constitutes them attributes of an individual. But that does not hinder them from being common to many parts of my experience and the experience of many people. Now, so far as an object is common to the experience of different people, these people can designate it by a strictly proper name, i.e. a name which does not rest on any analysis of its attributes. Thus "the sun" means the same thing wherever the English language extends, and would mean it all the world over if there were but one language. If, on the contrary, we get outside the group to which a given experience is common, the strictly proper name becomes inapplicable. The name word "John" means one person to me if I use or hear it in one company, and quite another in a different society. In such cases a designation by means of known general attributes is necessary. That which you have not yourself directly experienced, I must convey to you by a combination of words representing a synthesis of attributes, each of which you have experienced. Anything, of course, even a particular event like the Three Days of Milan, or the Hegira, can be referred to by a proper name when once described. But it remains that directly or indirectly the meaning of a proper name rests on the facts common to the experience of the speaker and the hearer. So far the proper names do not differ from names of general attributes. The difference comes in a later stage. The kind *for* explicit general content may, as we have seen, exist an indefinite number of times, and, for all we know, in indefinitely different contexts. The individual (as we shall see more fully later) is conceived as limited to a definite portion of reality, whether great or small. Its truly general attributes appear in other individuals as well. Further, the strictly

of any theory of the elements of knowledge. Acts of thought do not necessarily express themselves in words; nay, the activities which have occupied us in previous chapters are not capable of being directly and as such expressed. Nevertheless, in describing them we are bound to use language. We have spoken of the apprehension of a flash of light, the attention to a white spot on a red surface, and so on, though, according to our view, none of these acts are recognitions of general contents as such. In all such cases, then, we really mean that a content is asserted, known, or believed which, if logically treated by further activities, would be expressed by the term used. The apprehension of a flash is the becoming aware of a content which comparison, etc., would lead us to name flash. The memory of this or that is the memory which existing in a mind stocked with general ideas, is described as a memory of this or that. Thus the description of elementary conditions of knowledge, and the contents produced by any one of these in isolation, is possible only through use of other conditions. These "corrections" once understood can easily be applied whenever requisite.¹

proper name does not indicate him by any one of his attributes singled out for that purpose. In the degree in which any such name does "connote" such an attribute (as, e.g. John may be said to convey English speaking and male), it becomes an ordinary attributive name. Nor does the proper name cease to be applicable, however much its subject may change. Hector is still Hector however changed from the triumphant spoiler of Achilles; and even the nickname, though attributive in origin, "stricks," as we all know, throughout life. These considerations, which must depend for their further support on our views of the general nature of the individual, seem to have given rise to Mill's much misunderstood doctrine (*Logic*, bk. i. chap. ii § 5), that proper names are non-connegative. Mill certainly does not mean that the individual has no attributes, but that the proper name in designating him does not rely on his possession of any special attribute. It refers to the object as individual, not to his attributes, which are general. Mill pushes this point too far when he says that proper names have no "signification." That proper names are full of "meaning" is well brought out by Mr. E. C. Boussake *Proc. Arist. Soc.* forthcoming volume, 1895), but that they have meaning is one thing, that this meaning is general is quite another. The name of an individual means all that that individual is, but precisely on that account it is not as such a general name.

We may fully agree with Mr. Bosanquet (*Essentials of Logic*, pp. 94-97) that the view taken in this chapter is "not the only way of regarding" general ideas. The "generic" can also be treated as containing the "promissive and potency" of the specific, as a plan which may be filled up in more than one way. But so used it is scarcely a single idea any more, but rather a synthesis, explicit or implicit, of related contents. We have passed beyond the "moment" of abstraction as such to that of interruptive classification.

As to the "particulars" of which the general "consists," a word may be added to obviate misunderstanding. A concrete whole (A or a) has an element p_1 . This p_1 is a case of a general p. And of these particulars, p_2, p_3 , etc., the general consists. But the wholes, A, a, etc., are also particulars, and in them p_1, p_2 , etc. are mere elements. In this sense the general does not consist of, but is contained in, the particulars.

CHAPTER VIII

RESEMBLANCE AND IDENTITY

WE have explained general ideas as resting on the notion of resemblance. But resemblance itself and its companion, difference, are relations which have been no small stumbling-block to theories of knowledge, and therefore demand our attention.

1. Though the term resemblance admits of confusion, and therefore demands analysis, the facts of resemblance can only be analysed a very little way. It is simple matter of fact that I see resemblances and differences, but I cannot resolve this characteristic of the world into anything more simple. One step, however, I can sometimes take. Beginning with a vague perception of resemblance, I can analyse out a common quality in two objects presented to me, and see that while precisely alike in that quality they are different in other respects. That is to say, I can resolve likeness into identity¹ in difference. Two architectural styles, two pictures, two faces, two landscapes, two constitutions, two historical situations resemble one another; they "impress" us as alike, we vaguely say. Then comes analysis, and points out a common quality—the same development of constructive knowledge, the same technique, pose of the head, prevalence of democratic sentiment, decay of civic morality in the presence of a spirit of faction. Now it is explained—the common quality is clear, and the slight mystery which attends vague resemblance is dispersed; the remainder is mere difference, and does not interest us.

Which, now, is the ultimate of these relations—likeness or identity? In the instances given we proceed from a knowledge of likeness to that of identity, a fact which may tell either way. We may infer that identity is an abstraction

¹ The word identity is used here as=precise or complete likeness. That this conception is radically distinct from that of numerical identity or continuous identity I shall argue lower down, but the double or triple usage of the term seems unavoidable in English.

of likeness, an idea derived from reflecting on likeness and difference, seeing that most likeness involves or includes difference, and conceiving the likeness in abstraction from the difference. Or we may urge that if vague knowledge begins with likeness it rests really on identity. Likeness is always logically analysable into identity in difference, and therefore these ideas are its *logical* basis, that is, its ultimate basis in fact.

Both views, I believe, are too extreme, and they fail in distinguishing the perception of likeness and identity on the one side from the analysis of these ideas on the other. Both likeness and identity are matters of immediate apprehension, that is, reality presents us with both relations. If I consider the colour, shape, weight, "feel," etc., of a number of small shot run from one mould, they are all in these respects identical to my apprehension. A minutely accurate balance might detect a difference of a milligramme, but that is no difference to my hand; or a micrometer a difference of a millimetre, but that is no difference to my eye. The relation of perfect resemblance is thus given to my apprehension whether or not the shot, regarded as something physical (i.e. as existing apart from my consciousness or for some higher consciousness), resemble one another thus perfectly. The idea of identity is generalised from these resemblances, and they are just as truly perfect resemblances of the object as given as the rheumatism of an amputated leg is really pain. Just as the idea of identity is generalised from apprehension, so is that of mere likeness. Blue or green are something alike; orange and red are something alike; those two faces, figures, sounds are nearly alike. All these are facts that I perceive long before I can analyse them; and even when I can analyse them the original likeness in general remains,¹ i.e. the likeness though analysed into identity and difference is not analysed away. Likeness is not an unreal or even an evanescent relation of which identity in difference is the only genuine or permanent ground. Where there is likeness there is generally² identity in difference; but the likeness does not in the least bit cease to be real because it is then analysed. Brown does not look less like Jones because you have discovered that each has a Roman nose and a receding chin.

¹ I.e. unless some new turn is given to attention by the analysis so that we "cannot see the resemblance any longer." If the identity exists it is certainly not always discoverable, and if not discoverable, why is it assumed? It certainly, as Professor James has shown, contributes not a jot to the "explanation" of resemblance in general. See his controversy with Mr. Bradley, *Mind*, N. S. No. 5-8.

² It is a favourite doctrine of some authors that all likeness involves identity in difference. But what is the identity and what the difference between blue and green? I speak of the colours, not of the physical stimuli.

So far our result is that relations both of identity and of likeness are matter of apprehension. Both terms will then be the names of ideas generalised from apprehension. The ideas thus formed are, as the next step, compared, and the result of the comparison, about the method of which we shall have more to say presently, is to make clear the relation between them. Thus identity becomes known as likeness without difference, and likeness as identity plus difference. These definitions or analyses of the two terms mutually involve one another, and hence make it equally plausible to argue that either is ultimate. The truth is that the given is the ultimate; that both are given, but that they are analysed and understood by comparison with one another.

2. General ideas rest on comparison, and comparison reveals sometimes identity and sometimes likeness. Which, then, does an idea contain? "A" is a general content suggested of reality by an idea. Then does A mean A_1, A_2, A_3 , all identical with one another; or does it mean A a α and α , all resembling one another? It is reasonable to suppose that idea follows comparison, and that thus there will be two classes of general ideas to correspond with the twofold relation of comparison. Perhaps it seems difficult at first to attach any meaning to a general content which shall include not merely identical but similar facts within it. For, it may be asked, where are we to stop? If a heap is a hundred grains, "more or less," i.e. if it refers to a hundred grains or any similar collection, do ninety-nine grains form a heap, do ninety-eight, and so on, as the puzzle goes? In short, there is nothing precise or definite in our content. But this is just what we really find. There is a complete want of precision and definiteness about the majority of our ideas; they are kinglets whose territories are very ill defined, and whose boundaries are the happy hunting-ground of the sophist, the punster, the rhetorician, and many other knaves and fools. The idea is really king only in his own capital. The centre of the territory is definite enough. This is just; but push the principles of the action a step—is that just? We are not quite sure. A step further—that is unjust—clear daylight again. Now it is night. Now it is morning: both propositions are equally certain. What was it just between times? The only lesson that so many weary controversies have left us is that ideas are not as definite as we could wish. We make them, if we are honest, as definite as we can, but that is not saying much. There are ideas definite and ideas indefinite, and one object of scientific reflection is to transfer as many as possible from the second to the first class. The definite idea

suggests a content which is identical in all instances; the indefinite idea one of which all instances resemble one another. There are two sources of vagueness in the mass of our ideas. The first is that they are often generalised from contents which are not identical. Two facts, M and N, resemble one another in p, and p being asserted of reality, becomes the content of a general idea. But, now, suppose the p_1 of M and the p_2 of N are not identical, but only alike? Then the general idea p already has a loosely defined content, which, at least, may alternate between p_1 and p_2 , and over all the distance between them. That is to say, the mind, in applying such an idea, will consider anything to be "a case of p" which has either of the qualities p_1 or p_2 , or has any quality p which is "something between" the two. In all this the mind is probably not conscious of any difference between p_1 and p_2 , the distinction being drawn by later analysis. It is not so much that we take them for identical, as that we do not at this point distinguish between identity and resemblance. And here is our second source of vagueness. Supposing p a real identity (i.e. a resemblance in which no microscopic analysis can find a difference), it does not follow that it will be made a content of a definite idea. If the mind which asserts it of reality does not distinguish between identity and resemblance, it does not remain for that mind a clear cut content, nor will its application be restricted to contents exactly alike it. It will be "loosely" applied.

A vague idea, then, is one which suggests of reality a quality more or less resembling X; or, if you prefer it, which suggests that contents more or less like X qualify reality as an indefinite number of points. A definite idea suggests that X and contents exactly like X are found in reality. Ideas ought to be definite, but mostly are indefinite. The postulates of definiteness in an idea are, first, the general condition that the mind should have arrived at the distinction between identity and likeness, or at least should not assert them indiscriminately, and second, that in the special contents concerned analysis should have arrived at a point of identity. This definiteness is not reached all at once. Just as the general condition of definiteness is reached by stages, so with the actual definiteness of any special content. If p is common to M and N, p is a temporary resting-place for the mind; but further analysis may show (as above) that M had p_1 , and N p_2 ; that they only resembled one another, and that their resemblance was based on a common point σ . The same process may or may not be repeated, but the goal is in any

case a point of identity resisting further analysis, asserted with absolute definiteness, and applied always with identical meaning.

3. But this is not all. As we discriminate degrees or forms of likeness, we become able to make comparisons or subsumptions which are not identical but yet are definite. Identity is only one case of definite likeness. It is likeness without any difference at all. Substitute for it a resemblance admitting a *definite degree or kind* of difference, and we still get a definite assertion. Twice as loud, twice as tall, six, or attempt to fix, relations to some given content which are definite and yet not relations of identity. But in getting definite ideas we are able to assert with precision both identity and kind or degree of resemblance, identity itself being only a special kind of resemblance, viz. the maximum up to which degrees are measured. The advance of definition thus substitutes for a vague, indiscriminate identity-or-likeness, a precise determination of resemblance, according to kinds, one of which is identity. A kind of resemblance is itself merely a general idea formed by a combination of comparisons. "This is brighter than that." Here is first a recognition of resemblance or difference—it does not matter which we call it. Then the resemblance itself is compared with other resemblances, and a general idea "brighter" is formed, differentiated from other resemblances to the same qualitative content, such as "less bright," or, again, "as bright, but of different colour." Again, "brighter" breaks up by analysis into "much brighter" and "a little brighter," and so on. How far we can carry analysis by such simple comparison depends on circumstances. We shall see later on that a mediate comparison is necessary when we require mathematical exactitude. Meanwhile there is progress in another direction. "Brighter, louder, heavier," all involve the general relation expressed by the word "more," and "more" and "less" have also a certain community of content, which we express by saying that they give quantitative difference as distinct from qualitative. These are the *summa genera* of resemblance and difference into which all our apprehensions of likeness and difference fall. Thus the conceptions of quality and quantity are simple generalisations of the various resemblances which we find given among the facts of apprehension.¹

¹ It is, perhaps, best to make these two the only ultimately distinct kinds of resemblance and difference, and to treat difference of degree as a union of qualitative and quantitative difference—a quantitative difference which is also qualitative, or a difference in quality which is merely one of quantity. It

4. We can now understand that an idea may be definite and yet admit of much difference. Take a content like "green." All greens are not identical; but green is a definite idea, for one green differs from another in certain determinate directions, *e.g.* in saturation or in intensity. Greens may also differ in actual greenness, in quality proper, within certain limits. Now the idea green asserts or suggests any content within these limits indiscriminately, and if you say "The sea is green," you assert only that the colour of the sea falls within these limits, without assigning it a more definite place within them. Nevertheless, so far as this is concerned, the idea is precise. It is indefinite only so far as its limits in any direction are not precisely fixed. For example, where is the minimum saturation point below which green becomes white? or where is the line which marks it off from blue and yellow? In neither direction can the limit be fixed with absolute precision. But a very small step in either direction along the spectrum will make us at once say "blue," or "green," as the case may be. The idea is definite in this direction in proportion to the narrowness of this debatable ground; and, as we have already seen, the existence of such debatable ground does not in the least make green less truly green, or blue less truly blue.¹

It may be said (and up to the present chapter we have ourselves assumed it) that what makes an idea definite is the presence of some point of identity. In all green there is an actual point of identity "which makes it green." In all colour there is a more attenuated identity which makes it colour. This may be so, but we still require analysis to point it out. If I ask you what then is the common point in all colour, you will answer probably, "Why, it's—colour." You will not be readily able to isolate this "colour" in the concrete colours given you, and say what part of the given is to be set down to its account. If you make a further effort to define it, you will come back to the point you started from, and say that it is precisely that in which this tint is identical with all other

would be an error, however, to suppose that the conception of degree could be constructed out of quantity and quality in the abstract. Its value is merely that it recognises certain given facts of a special character, and it is from these facts that it is derived. In the genesis of all three conceptions we may note two movements: (1) the discrimination of the point of comparison, *e.g.* of the quantitative as opposed to the qualitative aspect of the thing; (2) of degree of resemblance in the points compared, *e.g.* quantitative proportion. The conception of quantity and quality could not be called complete without this power of measuring differences within them; and so far the conception of degree in the sense of nearness and remoteness of resemblance) is involved in that of quantity or quality.

¹ Cf. Lotze, *Logik*, bk. II. chap. II. § 183.

colours, as against those properties which it shares with some only. Meanwhile, if you have studied the matter a little, you will be able to tell me what *resemblances* this tint exhibits. It has its own place in the circle of colours somewhere between red and blue; it has such a degree of saturation, and so much luminosity—all of them definite points of comparison between it and other colours, and the general idea colour includes all contents differing from one another in these ways only. Now, I am not arguing against the existence of an identical quality in all colours, but I say that in the existing state of our knowledge such an identity is less definite and less easily assignable than the resemblances and differences in which all colours stand to one another; and that the colours themselves, in their analysed relations of likeness and difference, form the most definite content for the general name colour.¹ I conclude that when you say that a thing has colour, you assert of it a content which may vary within the whole range thus specified; and the idea of colour taken by itself suggests of reality an indefinite number of facts resembling one another in certain definite ways.

To put the point in a slightly different way. Admitting an identical character in all colours, and calling it, without attempt at definition, simply colour, we must admit that in the different tints which we see this common character is itself modified. Colour itself is differently qualified in red or in green. The scalene and the equilateral differ as triangles in those very features, relations of sides and angles, on which their character as triangles depends.² Contrast two patches of sunlight which differ only in the place on which they fall, or two notes which are distinct only in time. Here the time, place, or other characteristics qualify the whole which is given, but can scarcely be said to modify the colour or the sound, as colour or sound. We have come once more on the contrast between specific modifications on the one hand and mere differences of context on the other. The first may be said to qualify

¹ This, it must be remarked, does not make the conception of colour more, but rather less useful in thought. Though I treat colour as a reference to any and every kind of shade, this reference remains indefinite, or, as we might put it, disjunctive in character, and, accordingly, when I predicate colour of an object I assert only that its character falls within the limits of this disjunction. This is not false, but, if anything, poorer information than would be contained in the predication of a definite attribute, however abstract. This, however, seems our only resource when the universal is not capable of being constituted a distinct element for analytic attention within the whole which it qualifies.

² This is illustrated, e.g., by the fact that the straight line is the limit of the obtuse angled triangle. In the same way the ellipse, as we modify the relations on which its elliptical character depends, passes into the straight line at one extreme, or into the circle at the other.

the general content itself; the second, to be further qualities of the sensible wholes to which they belong. Now we cannot draw a hard and fast line between the two cases. The merest difference of context tends to assume a specific value, and to become a modifying character. Thus the texture of the coloured object would be naturally taken as mere matter of context, but the scarlet of a smooth ivory ball and of a soldier's coat, scarcely "look" the same. Even the heat of the sun and the heat of the fire might be said to have distinguishing characteristics; and the "same" note on two differently built instruments will, of course, present distinct peculiarities. It is enough to notice that the different "cases" in which a content may be present vary in the way in which they affect the content itself; and that in proportion as this affection diminishes, the easier it becomes to get at a distinct general content of precisely similar character in all cases in which it is realised. While in the converse cases the general idea tends to mean a series of contents which, while retaining a common character, must also differ in point of that character along certain definable lines.

To sum up. Both identity and likeness (of all kinds) are relations originally given in apprehension. Ideas may be founded upon either, and so long as different forms of likeness are not distinguished, ideas are vague; that is, the mind does not discriminate their contents from any similar contents. Forms of resemblance are compared, and give rise to ideas of them, discriminating different forms with increasing accuracy, and also discerning resemblances, with the result that differences are finally grouped under the heads of quantity and quality, differences of degree coming under both. Differences in any point admit also of being classified according to the nearness or remoteness of the resemblance, and identity is distinguished as the maximum of resemblance. When these distinctions are clear, ideas also become definite; their contents are either identical in every application, or vary within known limits, which can be defined with an exactitude varying according to the nature of the subject and our knowledge of it. We thus get two great genera of definite general ideas, those with an identical content¹ (e.g. the middle C of a piano, cobalt blue), and those admitting definitely ascertained differences (e.g. a musical note, colour). The knowledge of identical contents is the basis of measurement, and, therefore, of mathematics; the knowledge of degrees of quality, and affinities among qualities, is the basis of any systematic science

¹ More strictly a content as nearly identical as possible. Absolute definiteness is, I suppose, an ideal.

of nature. And this definiteness of knowledge rests simply on further combinations of the comparative judgment applied to the comparative relation, as well as to the things compared.

5. The simplest instances of likeness of any kind, exact or inexact, are, of course, those which we call purely "sensible"—the taste of two sorts of jam, the matching of two colours, the "identical" pitch of two notes. We have already seen that some degree of analysis is requisite for the detection of these simple resemblances, and it is a further stage of analysis—further, because dealing with a more attenuated character of the whole—when we attend to resemblances of quantity, equality, or proportion. Yet another stage of complexity is reached where the data of comparison are themselves complex. The contents compared are then results formed either by construction or analysis, and on this the analysis which constitutes the comparison has to supervene. Thus the judgment, "In these two triangles the sides about the equal angles are reciprocally proportional," involves attention first to each pair of sides, and then (abstracting from the actual lengths, etc., of the sides) the selection of the proportions of each pair as the point of comparison. Construction and analysis may go to any degree of complexity in affording us points of resemblance. Thus it is right to say that two systems of forces which produce the same motion have a common character. But what is this character? Not any one direction or quantity of any one force. We may have only one force in the first system and a hundred in the second, or we may have a hundred forces in each, acting at first sight in all manner of directions. There is still this one common point—that, if we sum up and consider together the totals of the forces, their directions and amounts, there will be as between all the components of each total a relation expressed by the fact that their resultant is of such an amount and direction, and this resultant will be common to the two. In cases like this we can in some degree "reconstruct" the totals, assigning their elements and the acts by which they are brought into comparison. But who can analyse resemblances of face, of personality, of style, of national character? The data here, the constructions and the analyses, are too subtle for recognition; but there is no need to regard them as fundamentally different. We may then look on analysis as an essential feature in comparison, and construction as commonly concerned in it; and calling those comparisons "sensible" which rest on the simplest and slightest analysis, we may say that resemblances become "intelligible" in proportion

as the constructions and analyses involved increase in complexity.

6. A word must be added here as to the senses, already referred to, of the term identity. I have used it in this chapter as a synonym for precise or exact resemblance (*Gleichheit*), and I think that that usage is in English unavoidable.¹ But I should be sorry to give any colour to the charge of confusing this kind of identity with that which we predicate of one thing in two relations, or of one person at different periods of his life (*Identität*). Quite different contents of perception or thought are before us in these cases, according to my view, which I will state, avoiding controversy as far as I can.² We have then three relations.

(1.) Exact likeness. We have seen that likeness in general may be often resolved into partial identity, which we must now call an exact likeness in some one point; and, for the sake of argument, we may assume that in theory this must always ultimately be possible. In any case, any consideration of such likeness as still admits partial difference will force us presently to the consideration of a likeness which is more precise or complete. What, then, is to be said of the relation of complete likeness? Take the objects which have served as a proverbial example of this relation—a couple of peas. These two peas are precisely, in all respects, alike. Can this be so? It may be said—(a) it is impossible. The chances are infinity to one against it. That they should differ in weight or colour, or size or texture, by ever so little, is infinitely more probable; and, however little the difference, difference it will still be; and if there is difference, then resemblance is not complete. This may certainly be true of the actual peas in their entirety, but can scarcely be said of such elements or characters of them as we perceive. The differences of weight, colour, size, or texture, if there, are imperceptible to us. So far the argument would not militate against complete resemblance between contents of our perception, memory, or thought. And even apart from this, if two contents, M and m, differ in some respects, they may be precisely alike in some others, as μ , and thus the

¹ See on the terms, and for a general discussion of the subject, Mr. Bosanquet's *Knowledge and Reality*, pp. 97 ff.

² This method seems best in view of the manifold verbal misunderstandings which have intricately intertangled themselves with real differences of meaning. It is however, as well to state that what follows in the text is written with reference to Mr. Bradley's *Logic*, esp. bk. II, part I, chap. vi; and *Appearance and Reality*, p. 347 ff.; James' *Psychology*, vol. I, chap. xiii, pp. 328 ff., the above cited controversy between James and Bradley, and the above passage cited from Mr. Bosanquet. Cf. also Mill, *Logic*, bk. II, chap. II, § 4, and Mr. H. Spencer, *Principles of Psychology*, pt. vi, chap. vi, pp. 58-64.

resemblance though the product of a further abstraction is still precise.¹ But (*S*) is not complete resemblance a contradiction in terms? For resemblance surely involves two terms that resemble one another; and these terms, if two are distinct, and if distinct then different, and if different then not completely alike. But the attribution of resemblance to two objects, of course, involves distinction. That I imagine to be taken for granted by anyone who uses the words, understanding the English language. But what is the distinction? It is one which we call numerical. There are two peas, or two contents μ , and as two they are distinct. But then are they not different? Certainly, in one sense. They are two. But as regards their character or quality they do not differ. The two peas do not differ (for our perception) at all: *M* and *m* do not differ, so far as μ is concerned. This is expressed by saying that the peas are completely alike, *M* and *m* completely alike, so far as μ is concerned, or precisely similar in the point μ . Then, have we two contents which differ without being different? Well, we have two contents which are distinct in number or in existence, but are not different in quality, and if you like to make a verbal puzzle out of this you can.

But is it only a verbal puzzle, or does not numerical distinction involve some kind of qualitative difference? Go back to the peas. If they are two, clearly they cannot occupy the same space at the same time. Conversely, if two contents really do occupy the same space at the same time (as we might say the colour of that marble and its coldness are referred to the same space) then, *ipso facto*, to be two they must be qualitatively different. If, therefore, we speak of contents as being two and yet qualitatively alike, we must clearly admit them to occupy a different position in the space-world or in the time-series, or in both. But difference of position means also difference of relations; and are not relations attributes of contents? We are again in a dilemma. *A*₁ and *A*₂ are exactly alike; but as alike they are distinct; as distinct they are differently related, say in space, to *B*. This difference of relation is a qualitative difference; therefore *A*₁ and *A*₂ are not exactly alike.

The puzzle might be answered on more than one line. We might say, "It is true that *A*₁ and *A*₂ do not completely resemble one another, if you take those words strictly. Any two contents must as two differ in something; but when they differ only in space or time relations we call them exactly alike, because this is the minimum difference possible." Or

¹ The attempt to deal with the question empirically is justly ridiculed by Hegel, *Wissenschaft der Logik*, vol. iv. p. 44.

again, to justify our language, we might question the propriety of treating a relation as a kind of quality. The qualities of A, we might say, all belong to it as such. They appear when we attend to A, and would appear just the same if we could concentrate our attention on A to the exclusion of all the rest of the world. Its relations, on the other hand, depend on B or C as well. Now, what we meant was that A₁ and A₂ were exactly alike in their qualities, although their relations are different. But neither of these answers—though the second, at least, is just—goes far enough. We must insist that resemblance not merely admits of difference, but implies it. We have been told this in slightly different language (identity being substituted for resemblance) often enough; but what has not been made sufficiently clear, I think, is what sort of difference is implied. A loose or inexact resemblance (*Ähnlichkeit*) may go along with qualitative difference; a complete, perfect, or exact resemblance implies a difference of position in the spatial or temporal series, and in that alone. It is false, then, to say that resemblance cannot be complete because the positions of the resembling pair must be different. For the relation of complete resemblance implies and contains this difference of position.

(ii.) Now take identity, and observe the contrast. I predicate identity when one whole has many attributes, or when one content stands in two relations. "The triangles A B C, B C D have the side B C in common." What is asserted here is not that there are two sides B C qualitatively alike, equal, but that there is one side, B C, common to two triangles. That is, two wholes (A B C, B C D) have one part actually in common, are partially identical.¹ Now take the M and m, which are partially identical, as each having μ , and what do we find? Two cases of μ . Take A B C, B C D partially identical, as having B C, and what do we find? One B C. We express the differ-

¹ We may think of the identity as predicated (a) of the wholes A B C, B C D. Then it is a partial identity, an identity in the part B C. Or (b) of the part B C. Then we are taking B C as a whole, which has two aspects, its relation to A B C and to B C D, and our judgment is analytic—that one whole contains two aspects. What we cannot do, as I think, and as most authorities seem to hold us to judge B C = B C, without taking B C either at successive moments or in different aspects. I say "judge" advisedly. Of course we can say B C = B C, and take it in no sense at all.

We must therefore accept Hegel's doctrine, *op. cit.* bk. ii. 1, chap. ii. A, *Werke*, vol. iv. pp. 29-36, that all genuine identity in whatever sense, involves some difference or distinction. Hegel's result here is sound and valuable, though his reasoning cannot always be taken seriously (*see, e.g.*, p. 32). It is unfortunate that the phrase identity in difference should have passed into a kind of catchword applied to every conceivable content of thought; especially since, as a rule, no attempt is made by those who use it to specify the kind of identity or difference in question.

ence by saying that the two instances of μ are exactly alike, while $B\ C$ is one fact in two relations; or that the identity of μ is qualitative, that of $B\ C$ numerical. The two cases are as distinct as one is from two.

(iii.) Identity is predicated in yet another sense, when we say, "That is the same man whom I saw at this very spot yesterday." I should consider myself to have been wrong if you proved that it was his brother, and only very like him, though I might still say, "Well, it's *the same face*," meaning now a qualitative sameness. That is to say, however much likeness affects recognition, I do not, by the *same man*, mean a very similar man. I mean *one* man; I mean that the man now before my eyes and the man of yesterday are one. It is, again, a kind of numerical identity that I assert, but with this difference, that difference in time (and perhaps in space) is not excluded. Before, when there was numerical identity there was actual overlapping in space and time. We had two wholes with a part in common. Now we have two contents separated in time. The oneness in this case, then, must be something extending in time or space, or both, beyond these contents, and including them. It is the sort of oneness which we call continuity; and where continuity is excluded, we do not attribute identity in this sense. This cannot be the same table that I had in my old rooms, for how could it have got here? I must be convinced, not of the closest resemblance, but of continuity of existence in a single unbroken thread, before I allow it to be the "same." The metaphor is not inappropriate, since material continuity in space is also a ground of "identity." We are holding the same thread in a tangled skein, not if both ends are qualitatively alike, for presumably many of the threads are that, but if there is a physical continuity from my end to yours. It is beside the mark to answer that continuity implies likeness. It is true, I imagine, that some likeness exists between the oak and the acorn, or between nineteenth-century England and the England of the Conquest, or between the Thames at London Bridge and the Thames at Lechlade. But the resemblance may be far less than that which unites "numerically different" things or persons. Two babies are more alike than either baby to his grown-up self. And dimness of resemblance does not interfere with completeness of continuity in development. In short, complete resemblance does not prove continuity.¹ Continuity does not prove

¹ When you "swear to identity" on the ground of resemblance, the inference, notoriously unsafe, is based on the rarity of certain combinations of qualities. Probably there are no two human faces exactly alike, so that

complete resemblance. And even if you could argue either way, they are different in idea. Continuity, numerical oneness, and complete resemblance, then, seem all to be different ideas.

But is it not all a matter of abstraction? Go back to *M* and *m*, and consider only the element μ . We have two μ 's. Yes, but disregard their setting. Then we have identity; and thus it may be said the reference in a general idea is really to an identity, not to a plurality of similar objects, since the idea considers the context apart from its setting. Should we not say, then, that identity in one kind of setting works out as resemblance, in another as continuity, in a third as numerical oneness? Well, we may say this if we like, but we shall be ignoring very fundamental differences; and, what is more, we shall be carrying abstraction further at one point than at another. For in the case of numerical identity, the unity of the connecting link is given at once by the analysis of the presented content. Nothing has to be ignored in order to recognise it. In the case of resemblance you must determine to overlook the duality in order to get at the unity. And as to founding any serious argument on that unity when you have got it, you might as well argue that you have had no cake, on the ground that you have eaten it. As to the idea, it certainly disregards qualitative peculiarities of different "contexts"; but if and in so far as it disregards all numerical plurality, the generality of its content is not explicitly realised. The content may be called general when regarded in isolation, because, so regarded, it is the basis of the resemblance which constitutes generality. We have therefore called it potentially general. But if there were no resemblance there would be no generality. You might still take things in the concrete, or take their elements in isolation, but the one would be as "particular" as the other. The quasi-generality of actually individual contents (Solomon, *Cœur de Lion*) rests, as we have seen, on this, that other things, taken as isolated contents, become general, and the same possibility is transferred to them. If, then, the ideal content is a numerical identity, it is *not* general; if general, it is not an identity. The three ideas of complete resemblance, numerical identity, and continuity, all tending to be expressed by the same phrases, are to be kept clearly distinct, and we shall use the above three phrases to distinguish them whenever necessary.

"Identification" is more possible there than in most instances, though we have all experienced comedies of errors. If you swear to a marked sovereign, your α (α is α) rests entirely on the improbability of anyone else affixing an exactly similar mark.

CHAPTER IX

I. THE QUALITATIVE JUDGMENT

THE term judgment is frequently used as a general expression for any kind of cognitive act. But two characteristics commonly attributed to the judgment appear incompatible with so wide a use. The judgment is generally taken to be an act of thought which employs ideas,¹ and which is directly expressed in the proposition.² I have tried to show in the preceding chapter that there are cognitive acts which do not employ ideas, and which are not directly expressed in propositions. Thus the apprehension of the present fact is (on my view) a form of knowledge, but quite distinct from the judgment which describes it, and needing some further intellectual act to render it expressible in the proposition. I have therefore thought it best to use the colourless term assertion for the general expression required, restricting the term judgment to the species of assertions which employ ideas, and are directly expressible in a sentence. Taking the judgment in that sense we have now to consider its general characteristics, i.e. its contents and conditions. We shall raise the questions thus defined for certain great classes of judgment separately, and then put our results together.

THE JUDGMENT OF QUALITY

1. Beginning with the qualitative judgment, we may put aside all difficulties as to its form. "It's pouring," "Fire!" "Too bad!" "How it hurts!" "What a pity!"—are all of them as much judgments descriptive of a quality of a present fact as the orthodox *S* is *P*. That is to say, they are so if they are meant so. The question between judgment and exclamation lies in the intention rather than in the form, though he who uses the set form commits himself, as it were, and cannot so well plead that he does not make a statement. At the same time, the full

¹ See, e.g., Bradley, *Logic*, I. i. 10.

² E.g. Sigwart, § 5.

form, "This is a hippopotamus," "This is blue," gives us the different elements in their most analysed form. Let us ask, then, what is the content of such a judgment? An obvious answer would be something of this kind. The fact referred to is something present to our observation ("this"); its character is expressed by the predicate ("blue"); the copula ("is") being the sign of affirmation. We are asserting a definitely characterised present fact. If it be asked, how, then, does judgment differ from simple apprehension? the answer might take two forms. First, it may be said, the detection of the character "blue" implies analysis of the given; and if, secondly, it be objected that still this is only analytic attention and not judgment, the answer may be that there is, in fact, no difference at this point. Analysis, it might be said, is a judgment; a judgment becomes a proposition when we name what we judge. Naming, then, in the sense of applying a term already significant, is the new activity involved. Here, then, we have arrived at a point of departure, and now at once a deeper question arises. What is the act of applying a name? What does it assert? The name we found above to be a symbol, and he who names a thing asserts that that symbol stands for that thing. So far, then, our result would be that the judgment recognises (a) the character of the present content, and (b) the appropriateness to that character of a certain symbol. There is this much truth, then, in the old nominalistic theory of the proposition that *primæ facie* its content is the relation of a symbol to a reality. This relation, again, is present simply as a felt appropriateness of word to object. And so much at least the judgment must assert.

But if this is the beginning, it obviously cannot be the end of our account. For what, analysis must first ask, is this felt appropriateness of a symbol to a given object? On what does it rest? A symbol, we have seen, expresses or stands for an idea; when we present a symbol to ourselves we mean something else; instead of directly and explicitly representing this something else, we fasten on the symbol. The symbol, then, or name is a mere cover for an idea; and if a symbol is appropriate to an object, it must be because the idea whose place it takes corresponds to that object. Here, then, at the second stage, we come to another old theory, that a judgment asserts the correspondence of a fact to an idea.¹ And this view, again, expresses at least one side of the truth. When I judge "that is a protococcus," the idea of an organism of that kind must be in some way present to me, however much it tends psychologically to be merged in the perception on the one hand and

¹ See, e.g., Sigwart, § 9, pp. 63, 64. Each is "one in content" with the other.

the name on the other. So far, we do not go beyond an apprehended correspondence of perceived facts on the one hand, and our idea represented by a name on the other.

But this account again cannot be ultimate. For the idea which we use must have some definite basis, and we must have some purpose in using it. Now an idea means something, that is, contains some sort of reference to or suggestion of reality. This reality must then somehow fall within the judgment, or be by it brought into relation with the present fact. What this reality is, and what the relation is, we may discover by attending to the proposition, and considering now the value of the symbols, i.e. the full meaning of the terms which it employs. Let us take the three words, "this is blue,"¹ and begin at the end. Blue is a general name, the name therefore of an ideal content. That is, the word taken by itself asserts or suggests a content common to various parts of the series of given facts, without specifying what facts. "This" is the name for the present as present. It has, that is to say, a general meaning like any other term, and its equivalent is "present." When a thing is "this" it is present, the general quality of being present is expressed by the word. So far, then, we have "this" = the present fact, "blue" a content already otherwise known to qualify reality. The connection between them is given in the copula. What does the copula assert? That may be got either by analysing the verb "to be" independently, or by inquiring what relation we are actually aware of between "this" and "blue"; and then (since our proposition is simply the attempt to express this relation) inferring that the use of the copula means or can mean (we need not hastily assume that the copula always means the same thing) just that relation. Take the second method first—what is the relation? Here is a content qualifying reality in an indefinite number of instances; and here, on the other side, is a particular individual fact. How are they connected? Is it by resemblance? This will carry us a certain length. "Blue," it may be said, is a reality already known as existing. It has been presented to me at sundry times and in divers contexts, and from these presentations I have by comparison and retention formed it into the content of a general idea. It means to me a fact which has qualified my reality. Now "this," again, is a fact of apprehension, and what do I find? That it *resembles* the fact already determined and

¹ Judgments of this type, which are real acts of thought only for an infantile intelligence, form the best examples of the qualitative judgment. Other instances used in this chapter, though suitable for present purposes, often contain implications which would in strictness carry us beyond judgment proper.

named "blue." "This is blue" then should mean, "This resembles the reality to which the name blue refers."

This account would not (I believe) lead us far wrong. But it omits a point of importance. It tacitly treats the idea (or name) as standing for a *given* reality—the experienced instances of the general attribute. To these experienced instances the present fact enters as a new case, and the relation between them is, truly, that of resemblance. But the idea and name, it must be recollected, are general. They refer to no definite section of experience, to no single set of cases or period of time, to the exclusion of others. The general content is already suggested of reality as a whole. Future or possible cases, as well as actual or past instances, are within the terms of its reference. We are therefore bound, as it would seem, to take the new case, not as an outside fact related to it, but as actually falling within and exemplifying the general content itself. The relation, then, is rather that of identity than resemblance. But the identity is not absolute. The general content is not confined to this particular case, but extends to others—what others, how many, when and where found, is not in question, but others. The present, then, is one case of the general content. It is, we might say, identical with one part of it, and so the relation expressed is one of partial identity, or subsumption; or starting from the side of the general, we may say that it is applied to the present instance. Our result, so far then, is, that the qualitative judgment, taking the full meaning of the symbols used, asserts that a present fact is in virtue of some of its features a case of a general content.

But, now, if we examine this result we shall see that it is not so far removed from the interpretation of our judgment as expressing resemblance. For what is the general content? You may take it, on the one hand, as something existing "in my mind," and expressed by the class term. Then the "subsumption" would assert the correspondence of this present fact among others to the "mental" content or its symbol. But this analysis is substantially that from which we started. We saw at once that the judgment expressed the relation of a symbol (and that implies an idea) to a real present object; and our question has been, what more this symbol means. Considering this meaning, we found that it is a reference to a general content; and what is a general content? Something which is realised in many individual cases, or, to put it the other way round, a number of individual facts resembling one another. What, then, is the real fact asserted when we subsume a new case under a general? We may phrase it so that the new fact

appears as one of a number. But it would be misleading to put it in this way if it suggested that the number was a more or less definite series in which the individual had some place more or less definitely assigned it. There is no question of "inclusion" in a class, if a class is like a bag into which you put your sponge.¹ What, then, is asserted? Simply resemblance to other individuals.² That is the true character of reality, with which the qualitative judgment deals. Then why not have accepted our first analysis? Because that limited the individuals to which the judgment refers, and defined them too far. The resemblance asserted holds not only between the given and certain facts already presented, but is valid for an indefinite number of facts past, present, or to come. This potentiality of resemblance is the point at stake when, as in this judgment, we treat an individual fact as general. It is a stage in the reduction of facts to an order of resemblances and differences, a stage in which the mass of facts to which the present is correlated are still left indefinite. This indefiniteness we shall see in part removed by the comparative judgment which so far renders the content in question more explicit.

2. So far, then, for the content of our symbols. If, in the qualitative judgment, we "mean all that we say," we are taking an apprehended fact, analysing it, and discovering it to be, through one of its elements, an instance of general content.³ Beginning by treating it as an act of analysis, expressing itself in a name, we have been forced to consider what this name implies, and to include its implication in the content of the judgment. The judgment, then, has a dual character; it is first an act of naming an analysed content; and, secondly, if we examine it further, an act of subsumption. But this position is not free from difficulties. The subsumption (assuming the correctness of our account) is implied by the terms used in our proposition.

¹ This, of course, is the conception of class predication against which Mill's polemic (*Logic*, bk. i. chap. v. par. 3-12, quite rightly, directed. The classes simply constituted by and dependent on the possession of the common attribute, and, far from being a definite collection, it is of indefinite extent and destitute of order. On the other hand, the ideal content has extension, i. e. plurality of application, and this makes it a basis of resemblance. And this element in its meaning must not be neglected, but must form part of the whole implication of any judgment which employs it (cf. Bradley, *Logic*, bk. iv. 1, chap. vi., esp. the summing up in par. 21).

² Resemblance, more fully, of this element in this given content to elements in other wholes.

³ I speak indifferently of the concrete fact or its analysed characteristic as being an instance of, or subsumed under, the general. In the same way we speak indifferently of the subsumption meaning ultimately a (relatively loose) resemblance of this whole to other wholes, or a (relatively exact) resemblance of this element or attribute to other elements.

But is what is implied to be taken as actually asserted? If, from the spoken proposition, we go back to its mental equivalent, what shall we find? Shall we get a direct reference to a general character of reality as including this instance? Shall we get the content of our symbols realised adequately, or even at all? And if not, can we strictly say that that content is actually asserted by him who utters the proposition?

The difficulty is not an idle one, and arises, I imagine, on any theory of the judgment and its import. We wish to measure the content of the judgment by means of the proposition, and we feel that the two ought for a careful thinker to correspond. Yet everyone knows that words are used and sentences uttered habitually, with a very imperfect realisation of their meaning. It might be objected that such sentences no more concern us as logicians than Aristotle's drunkard who could roll off lines of Empedocles, or Mrs. Gamp's patient making up a string of names. But to take this line would be to ignore what we must almost call the normal relation of thought and language, and to omit from our view the great majority of the judgments which men actually make. For, however much logic might demand that every assertion should directly, explicitly, and completely realise the content which it asserts, our actual thoughts as often as not occupy themselves wholly or partially with symbols. Just as in Chapter VII. we saw that symbols acquire a fixity of meaning by a process which is gradual and at first unconscious, so here we must admit that in their employment by the adult, words may be used with imperfect consciousness of the meaning which is the only logical reason for uttering them. Analysis may show that a proposition would be meaningless or impossible unless certain things were true and known to be true. Logically, then, those things are asserted, but it does not follow that they enter into the explicit purport of the judgment which expresses itself in that proposition. So it is in this case. The content of a general idea is one which must be applicable to many instances in reality. But it does not follow that that plurality of application is mentally referred to whenever we employ the general idea. On the other hand, the idea, as we have seen, may merely suggest a content of reality without reference to its repetition in many instances; but if the content is, in fact, known to be repeated, if we at different times do actually apply it to case after case, then it is a *de facto* general content. Now this is the case with the idea used in the qualitative judgment. The present fact is identified with a content which is *de facto* general. If we give the whole meaning of this content, its

generality must be brought out. But we may use the ideal content without actually realising its whole meaning. Nor is this all. What we actually use in the judgment is not necessarily the ideal content at all, but only its symbol, the name. The symbol takes in our thoughts the place of the reality for which it stands; and thus in the judgment our actual consciousness seems often to be concerned, on the one hand, with the given and its character as detected by analysis; and on the other, with the feeling of familiarity attaching to this character, and the consequent appropriateness of the term used.

But, now, whether or no the full implication of the words is actually represented by the mind in the act of judgment, it must be admitted to influence and, in fact, determine that act. This holds even for the exclamatory or interjectional use of language. The child who cries "gee-gee," or the man who exclaims "lightning," make no conscious reference to a general characteristic of things. They are concerned with this horse, this flash only. But, first, why do they utter these exclamations and not others? Because of previous experiences in which the same general content has appeared and has had the name applied to it. Thus, whatever they know or think on the subject, the *de facto* correspondence of the general and particular is *de facto* influencing them. Secondly, why is the name understood? Again, whatever may be thought by the hearers, the *de facto* conditions are precisely the same. The content symbolised, then, is at least the condition both of the use of the symbol and of its being understood.

We have then before us the upper and the lower limit to the meaning of the qualitative judgment. Taken as an explicit assertion of all that its words mean, it is a recognition of the present as a case of a general content, that is, as a centre of resemblance to an indefinite mass of facts. Taken at its lowest, it is an assertion of the appropriateness of a name determined by the fact that the present is a case of a general content. In either case the relation of the general content to the present object is the really operative condition; but how far it actually enters into the sphere of conscious thought is a question which would require a different answer for every judgment which we make. The actual judgment moves within the limits assigned. At its higher stages, where the generality of the idea used becomes explicit, a definite reference to other cases begins to come in; and as soon as these cases are defined or individualised we pass into the comparative judgment. On the other side, where the felt appropriateness of name to object gives way to merely mechanical utterance, we fall from

judgment into the sphere of exclamation. Between these limits the qualitative judgment is to be found.

3. Certain difficulties in the above view remain to be discussed. To begin with, how can we "identify" the present fact with the general content? What is the present fact? It is not only blue, but various other things as well. It is rough, oblong; it is placed in such a position, it is a particular shade of blue; and, again, it is not all blue, but has spots of black ink on it. These are serious drawbacks to calling it blue without any qualification. Still they do not interfere with the application of the general attribute properly understood. Every fact which I can call blue, from the summer sky to a pair of wintry hands, has a certain vague resemblance; and so far as the idea of blueness is confined to this vague point of resemblance, it may be correctly applied to any one of them, differences being left out of account. But to effect this we need an act of analysis to pick out of the whole that is given the quality blue which is common to other objects. When this is considered, the relation is seen to be a degree more complex. There is the selection in the whole presented of a certain element, implying a distinction of part and whole, and then a subsumption of the part under the general content. The relation then becomes a partial identity in a double sense. The given as having such a quality or element is a case of a certain general content—that is now the analysis of our judgment. The one term of the relation then itself involves a relation. This relation, however, is merely the selection within the present fact of one feature marking that fact. That is, to determine the subject of the judgment we do not need to go beyond the present. The ultimate starting-point on this side is the present fact.

It may be objected with some cogency that the present fact is rather a vague term. If I mean by it something definite, like the back of a book which I am looking at, can it be said that that is all that I am aware of at present? It may be occupying my attention, but even so there will be a "fringe of consciousness" beyond it; and, further, does not the formation of the qualitative judgment precisely correspond to the concentration of the mind on one part of the present, the selection, in short, of "this" from its surroundings? We may admit much of this, but observe at the same time that there is a change in the process of selection corresponding to our description in Chapter III. The picking out of the book from the vague mass of the present is a simple concentration of attention. A fringe of consciousness no doubt remains, but has no logical connection with the content apprehended, and

has no interest for the attending consciousness. But when in the content now attended to, the book, we pick out a characteristic blueness, the whole content remains a matter of interest to us. It is of it as a whole that we make our assertion. The analytic act of attention gives us an element in a whole, and the qualitative judgment asserts an identity based on this element. The judgment is about that whole which is occupying attention. If we are asked, then, what is the ultimate subject in the qualitative judgment, we must answer that in *the simplest case* it is the whole present on which attention is concentrated. The mind does not here make any reference beyond the present; so far as the subject is concerned no knowledge is necessary for the mind except the knowledge of this whole. It is not determined or made clear to the mind by its relation to anything else. But must it not be distinguished at the very least from other contents? It must certainly be distinct, but it does not follow that it must be distinguished. To distinguish a thing may mean simply to contemplate a thing "by itself," not to confuse it with other things. This is certainly needed, but involves no presentation or representation of a relation between this thing and others, being, in respect to other things, a purely negative state of mind. To distinguish a thing in the sense of knowing its distinctness, of knowing how it is distinct, and from what, involves knowledge of its relations to other things. Now I must distinguish the present fact in the first sense, but I need not in the second. The apprehension of the total present or the concentration of attention on a part of it, is not the same thing as apprehending or knowing its relation to other contents. These relations, and the distinctions involved in them, become clear when the facts are brought together in one act of thought, as by memory. The distinction depends on the bringing together of two facts given separately; their being given does not depend on their being known as distinct.

My apprehension of the present cannot in anyway be constituted by the relations between it and other things. They do not determine it, but it determines them. The position of the present is not known as being after something which was, but that which was is known as before that which is. I do not build up my knowledge of the present by finding out relations between it and other things, but I start from the present in determining other things.

These simplest judgments are represented verbally by the impersonal form or the interjectional judgment. "It's a bad job" or "first!"; or, still better, a baby's "da-da," "gee-goe,"

contain no symbol specifying the position of the content in reality. The interest is concentrated on the content and its character, that is, on an element of the present fact, and nothing further is under consideration. When the subject is designated by "this" or "that," it must be allowed that a slight change takes place. "This," we have contended, has a general signification, viz. that of presence. So far there is no indication of other things. But bearing in mind that words are used for purposes of communication, we must ask why we have to designate the present as "this," and we shall have to answer, that it is because the present is not the only reality, and that our hearers' attention may not be concentrated upon the fact which interests us. So far, then, a distinction from other facts is implied in the use of "this." But this distinction implies no reference to the definite character of such further facts. The present is taken as a fact within a wider reality from which it is marked off. What that reality may be does not concern the truth or value of our judgment. Nor does the reference to it belong to the genesis of the judgment as such,—for the simplest cases are without it,—but to the wider constructions of reality into a spatial and temporal order which go on *pari passu* with the formation of the judgment, and force it to define itself with reference to them. The qualitative judgment, then, takes a whole of apprehension (which in the most explicit case it distinguishes from a wider reality), and, analysing out some element of this whole, subsumes it under a general quality, or if we start from the other side, it applies a general quality to an element taken as before.

As to its explicitness, this analysis is in much the same case as the general idea. There is a parallel development. From the beginning the given must really be analysed so far that the quality named is distinctly present to the mind; but that it is a quality, an element in a whole, which is the "this" that we see, becomes explicitly admitted only as we realise that the object attended to is more than that which we predicate of it. The form appropriate to this stage is that in which the (grammatical) subject is designated by a class name; when for "It is hot," we substitute "This water is hot." There is a still further development, but in a direction which soon takes us beyond the qualitative judgment when the perceived object is taken as related to others. The lowest grade here is a simple but explicit distinction, "That book (not *this*) is the one I want." 4. We have assumed so far that the judgment has only to analyse the given in order to bring it under the general idea;

and this may perhaps be taken as holding universally for the class under consideration. But we must observe that the relation of the idea employed to the fact given may vary materially. In "It is quite warm," the attribute subsumed under the general idea is an actual element in our perception; nor is anything further stated about the present content and its remaining attributes than is already present. In "He is livid with fury," his appearance is given, but not the emotion prompting it. On the strength of the appearance you apply an idea which carries you beyond the given, and asserts of the present fact some further characteristic not strictly observed. Ordinary judgment does not observe this distinction, but logically it carries us over the boundary line into inference. In concrete thought the distinction between ideas which do and those which do not "extend" the present, i.e. assert of it attributes which are not given, is difficult to draw with precision. It is often hard to say how much is given and how much the idea really contains. The theoretical distinction is clear enough. A subsumption which adds nothing but itself to the present, i.e. which states the conformity of the present to a general attribute, is judgment. If it adds more it is logically inference. But the inferences do not cease to be judgments; they still subsume, though they do so on a different basis and with further results than the judgments hitherto considered.

This understood, we need say little of the case where the qualitative judgment does not rest on observation at all, e.g. when I judge the character of the present or past on the strength of another's statement. The basis of the judgment is altered, the judgment is the same, viz. that the present¹ or past fact contains an element falling under a general content. In this case we should call it, not a subsumption (as of something already given), but an application of the idea to a fact occupying a position in reality determined by the demonstrative taken in connection with my relation to the person using it.

Lastly, recognition does not differ in its elementary form from a qualitative judgment. We recognise *primarily* by character, and so the act of recognition is a subsumption of the present under the already experienced content which the proper name means for us. "Da-da" is properly a recognition, "gee-gee" or "puft-puff" a qualitative judgment; but either of these last are recognitions, if applied day after day to the same toy. Obviously at this stage the difference only exists for a more developed consciousness, i.e. it depends on the distinction

¹ The present here should mean present to the speaker, not to me. The distinctive force of "this" is here at least essential.

between the natures of the individual and universal, which is not contained in the judgment as such.

5. The content of the judgment now being understood, let us consider its conditions. These are, first, the apprehension of the present fact; second, knowledge of the general content; and, third, the application of this content to the fact. The last two demand further analysis. As to the ideal content, we have already seen the conditions of its formation, viz. analytic attention to be given, comparison (resting on the constructive activity of the mind, or on mere apprehension of similarity), and, of course, memory. As to the presence of the idea in the mind, we must not be led into assuming too much. The case is similar to that of memory. An individual apprehended fact is retained, not in the sense that it continues to exist as a permanent state of the mind, but in the sense that it leaves permanent effects on the mental structure, such that an appropriate stimulus will cause it to be asserted as a past fact. At least no further condition than this is implied by memory. As it is with the individual, so it is with the general content. The idea is present or continues in the mind in the sense that the mind can again assert the same content. When we speak of the presence of the idea as a condition of the qualitative judgment, we accordingly mean that perception must act upon a mind modified by the past assertion of an ideal content in such a way as to be capable of reasserting that content, and that the act of perception stimulates to such reassertion.

The third condition also demands notice. The idea must be applied to the present content. The idea itself is the suggestion of a certain content, the apprehension is the assertion of another. The application of the one to the other means the assertion of the two as one whole. General and particular content with the partial identity involved are asserted together. That is to say, we have another case of construction, the assertion of a whole of which the elements are or have been given. I do not mean that in a qualitative judgment you necessarily place the idea before you, as though it were an image, and so compare it with the given. I mean only that just as "this" means the present, so "blue" means the general quality; and so also the whole judgment means the subsumption of the present under the general quality. The act of forming the judgment, then, as distinct from the antecedent conditions, is an act of construction joined with an act of analysis applied to the given content.

Lastly, in choosing a name, that is, in connecting a special symbol with a given content, judgment involves inference. But

here we may make a distinction. So far as the process underlying the choice of words is concerned, inference has no place. The knowledge of the relation of the given content to the general attribute, or of its correspondence to the idea as a mental state, is given, not by inference, but by memory and construction. Inference comes in with the choice of the name. So far as a fixed symbol uttered or not enters into judgment, so far inference is involved. So far as the comprehension of the real relation on which the symbol is based can be separated from the symbolism, we may speak of it as judgment proper, and deny that the judgment-function as such depends on inference.¹ The qualitative judgment, then, would be explained by the factors of knowledge already distinguished being the result when they are combined in a particular way.

To sum up. The qualitative judgment overtly and professedly names the present content as something familiar. In so doing it implies the appropriateness of the symbol used; and this involves the presence to perception of a character corresponding to an idea already entertained: this correspondence involves the subsumption of the given under a general content; and this subsumption, again, means the resemblance of the given character to any other case in which the ideal content may be realised. Any part of this content may enter into the explicit purport of the judgment. In its higher stages the judgment assigns to the present a definite place in the series of given facts. The conditions on which it rests are apprehension, analysis, memory, and construction; while, as correctly expressing itself in a proposition, it involves inference. An essentially similar judgment may be based on remembered or constructed contents, instead of simple analysis of the given.²

II. THE COMPARATIVE JUDGMENT

6. In the Qualitative Judgment the second or non-presented term is a general content attributed to reality without specification of when and where. Substitute now for this an

¹ Inasmuch as symbolism or verbal utterance is rather the mechanism, and the relation of ideal and present content the essence of the qualitative judgment, this use of terms seems justified, and will be adhered to. For this reason we have already distinguished judgments which do from those which do not involve inference in the real relation which they assert, as well as in the use of the terms whereby they assert. The former class are inferential in respect of their most important features.

² My chief debt in the above account is to Messrs. Bradley and Bosanquet, though I also owe much to Sigwart, and, of course, to Mill.

individual fact apprehended or remembered, and we get the comparative judgment. The qualitative judgment implies the existence of individuals resembling the present fact, for without them the idea would be nugatory, as an idea of something never realised. But it does not specify any such facts, it does not hold them up to view together with the present. This is the work of the comparative judgment. We have already touched on this form of assertion, but must now treat it rather more systematically. Simple or indefinite comparison deals merely with the relation, the resemblance of the two contents compared. To effect this it is not necessary to use a general idea. The resemblance may be given or may be "constructed." In either case it is an individual relation, if we can speak of such a thing, existing between two individual facts. Nothing general or common to other facts enters into consideration. It follows that this assertion does not strictly fall within the limits of the judgment as we have defined it. When I say, "That leaf is darker than this," I make a proposition; but then I am designating the contents compared by general names, which implies that I view them in the light of general ideas. Besides, it is worth noting that the proposition just quoted is scarcely a fair example of indefinite comparison, since the word "darker" implies an analysis of the points of resemblance and difference. This shows us that only the crudest comparisons, involving simple likeness and unlikeness, fall strictly within the province with which we are dealing. "These hats are like the fashion of ten years ago," is a fairer example. Here, then, all that turns the assertion into a proposition is the designation of the contents compared by the names of the hats of to-day and the hats of ten years since, in addition to which it must be said that the relation of vague likeness has itself become an idea, and is symbolised by the term "resemble" or "like." But every act of mind, from apprehension upwards, is turned into a judgment by applying general ideas, and into a proposition by applying general names to its content. And the question whether an assertion is a judgment, is to be settled by asking, not whether it is expressible in a proposition, but whether it is so expressible without the mediation of ideas unnecessary to the assertion itself. According to this test, simple or undefined comparison is not a judgment, but is antecedent to the formation of judgment, inasmuch as it has a hand in the formation of ideas.

Defined comparison not merely asserts a resemblance between two contents, but asserts it on the strength of an analysis. Its scheme is $A \propto$, as having A , is like $A y$, or the A

of $A x$ is like the A of $A y$. "These colours are alike in tint, or in intensity, or in saturation." "These notes are of one pitch, of different timbre." "John is as tall as James" (= is like in height). All these cases involve analytic attention, and compare the wholes on the strength of the analysis. But even among these we must make a further distinction. If I judge $A x$ to be like $A y$ in A , that is a true judgment, because I apply the general idea A , for which I have a general name, so that my judgment is at once the basis of a proposition. But if the point of resemblance is not an idea already known to me, the comparison is not a true judgment. Doubtless it results immediately in the formation of an idea for which I endeavour to fashion a name, an endeavour always made by language when new observations give it new general contents. But the idea being formed *pari passu* with the comparison, cannot be regarded as applied by the comparison. Whence, if judgment involves the application of an idea, defined comparison in these cases is not a true judgment. Let us then distinguish the cases in which an idea is applied as comparative judgments from both defined and undefined comparisons in which an idea is not applied. With regard to the conditions of these forms of assertion, comparison (defined or undefined) has already been shown to depend on an act of construction. The comparative judgment involves a repeated construction—of the relation of the two qualities to one another, and of the conformity of both to the general quality contained in the idea.

7. Comparison and the qualitative judgment in their several stages imply one another. If "This is A " means anything, A must be an idea already referring to some other reality, A_1 , and A_1 must be like A . Conversely, if A is like A_1 , it is generally to be supposed that they both can be subsumed under a general idea α . Here the undefined forms of comparison and of the qualitative judgment are seen involving each other. Passing to the higher forms, "This contains the quality A " equally implies resemblance in point of A to other things, and conversely. Finally, the comparative judgment proper is an analysis both of the comparisons and the qualitative judgments preceding it. " A is the common property on which rests the resemblance between $A x$ and $A y$." This justifies the qualitative judgment, "This ($A y$) is A ," by explicitly declaring the comparative relation to another individual fact necessitated by it. Similarly it fixes the point of resemblance in $A x$ and $A y$ as the definitely known content A .

The set of facts with which both qualitative and com-

parative judgments have to deal is the presence in reality of a general quality existing in an indefinite number of facts, forming, in general, a part only of the content of each, and constituting a resemblance between all of them. We may distinguish two main aspects of this set of facts—(a) the existence of the quality; (b) that of the relations of resemblance. With one or both of these aspects all the mental operations of which we have treated in this connection are concerned. Thus—

- (i.) *Analytic attention* asserts the existence of the quality of the given, without dealing with its resemblances or thinking of it as a general quality.
- (ii.) *Undefined comparison* asserts the relation of resemblance between two facts present or past, without specifying the quality on which the resemblance rests.
- (iii.) *Defined comparison* rests the resemblance of two facts on a common quality, without referring that quality to a general idea.
- (iv.) A *general idea* is a reference of a quality given in defined comparison (as common to two facts) to reality as a whole.
- (v.) *Qualitative judgment* asserts a quality of the present as conforming to the content of the idea.
- (vi.) *Comparative judgment* asserts resemblance of two or more facts in point of a known general quality, or asserts a general quality to exist in two or more facts.

This order represents the increasing definiteness or explicitness of knowledge in this direction, the higher forms at each point making use of some or all of the lower. In the final stage of the developed comparative judgment we have, in a kind of miniature, the whole account of that part of the nature of reality with which this series of operations deals; we have, namely, the explicit recognition of the general content, present over and over again in the world of existence, determining resemblances between the particular facts in which it is found. The lower forms of assertion lead up to this by expressing various parts or aspects of the general conception. All these assertions rest ultimately on the four conditions of knowledge hitherto distinguished—apprehension, analysis, memory, and construction. I do not mean that many actual qualitative or comparative judgments may not involve further factors, such as inference. "That is a man" always, I think, does, and yet it would generally be classed as a very simple qualitative judgment. But these judgments do not, apart from their verbal expression, necessarily, or as such,

involve inference; in many cases inference supplies part of their data, but not always. These forms of thought would remain to us if our powers of inference were paralysed; to analyse their nature and constitution it is necessary, if we take inference into account, to observe carefully the limits of its function.

CHAPTER X

THE JUDGMENTS OF RELATION AND DESCRIPTION

I. THE RELATIVE JUDGMENT

1. We have seen the qualitative judgment rise to its full degree of explicitness and then pass into the judgment of comparison. This transition is necessitated by the character of the general content, which, to be definitely recognised as general, must be taken as applying beyond the bounds of the particular case. Here is already a vague reference to other cases, some of which are explicitly designated in the judgment of comparison. This transition, then, rests on the predicate—to give that name provisionally to the general content employed in judging. An analogous transition is determined by the subject—the individual presented.

We have already seen that the subject is the present fact, or a portion of the present. In either case it exists in reality as an element in a continuous world of perception. We have argued that in the simplest form of the subject no reference is involved to this wider reality. Nevertheless, for purposes of communication it is impossible to go far without at least so much reference as is involved in distinguishing this subject from others. And whatever the contents judged, in reality the surroundings must exist. A step onward is taken when they are brought into the judgment, so that the subject is now further defined, not merely by the attribute assigned to it, but by its position or relation to other things. At this stage we have not, "That book is *Pickwick*," but, "The volume next to *Vanity Fair* is *Pickwick*." The purport here is still to point out *Pickwick*; but it is essentially the same judgment, with the slightest shifting of interest, when I say, "My volumes of Dickens and Thackeray are on the same shelf."

We have here a new complication introduced. The perceived fact, which forms the starting-point of the judgment, is no longer a simple quality, but a relation involving two terms.

The first form of judgment in which this complication arises is that which deals with the relations of facts as dependent on the order of their apprehension. A was before, is simultaneous with, or after B, above, to the right, to the left of B, and so forth, are simple judgments of relation or construction upon which more complicated ones are based. We confine ourselves for the present to judgments whose data are apprehended facts, so that we have only the simpler forms of relation before us. Let us consider how these judgments differ in content and conditions from the qualitative judgment.

In the judgment "A before B," when the whole A - B is present to apprehension, we are clearly asserting two distinguishable parts of the given whole, and also the relation between them. Moreover, since each of the three words used (A before B) is of a general character, we are comparing both the parts A and B to some general qualities of reality, and the relation to some general relation. It is not necessary that the whole A - B should be capable of subsumption under some general content $a - B$; it is only to the constituents of the relation that the ideas must be applicable. Further, A - B taken together will not probably be found to exhaust the whole of the present fact; there is a remnant X which is more or less clearly present to consciousness, as going to constitute the whole out of which A - B has been selected by the analysis of attention. Thus in uniting A and B the judgment might be called synthetic, but in distinguishing qualities in the whole it is even more analytic than the judgment of quality. The reference to the whole may be inexplicit, but may be pretty obviously implied by the nature of the case. "The cylinders are underneath the boiler," would imply in most cases that a locomotive was the true "subject." To bring the locomotive into the judgment is clearly a very small step.

We have, then, as our content, two given qualities as cases of two general qualities in a relation which is a case of a general relation. This at least is the full implication of the terms, which, as in the qualitative judgment, is more or less realised in different instances. Each element is "felt" as familiar, or recognised as corresponding to our ideas. From the content of the judgment the conditions are clear. We have the same factors as were found in the qualitative judgment, excepting only that the act of analysis is repeated. We must, in order to assert a relation, analyse out of the given, not only A, but B, and the relation between them. This repeated analysis gives ground for a repeated comparison, and

this is the only new factor introduced by the judgment of relation.¹

II. THE DESCRIPTIVE JUDGMENT

2. We may perhaps group somewhat more advanced cases of judgments which we have already had under this name. In the qualitative judgment we deal with a part of the given whole; in the relative judgment, with a relation of two parts; there remains the relation of part to whole, the constitution of the whole by the parts, which is the work, never perhaps adequately performed, of the analytic or descriptive judgment. This judgment combines, in a way, the characteristics of the two others. For the qualitative judgment states a quality of the given whole. But it concentrates attention on one element, and does not attempt to describe the fact as a whole. The relative judgment, again, puts different elements together, but tends to lose sight of the whole to which they belong. The descriptive judgment keeps the whole in view while detailing the parts. Its ideal would be to exhaust the whole nature of the given; but it is the continual mistake of the analytic mind to imagine itself to have succeeded in this Sisyphean task. We must not therefore confine the name of descriptive judgment to assertions of an equation between the parts and the whole, a complete construction of wholes by parts, lest haply we shall have a class without members. We should call all judgments descriptive which involve, like the relative judgment, repetition of the analytic act; but, unlike the relative judgment, explicitly designate the whole to which the parts so selected belong. We have seen already that the relative judgment passes by easy transition into this class, and the transition is represented verbally by the change which makes the whole fact the grammatical subject. The qualitative judgment passes into the descriptive as the qualities selected become complex. Such complexity involves plurality of attributes and relations between them, and thus the descriptive judgment is simply a completed form of the judgments of quality and relation. Any description of a person or landscape, or scene, might be taken as illustrating this judgment.

We may add that there is one judgment requiring to be distinguished from the above. It also involves a repeated

¹ Cf. on the whole subject, Sigwart, §§ 10 and 12. The judgment expressing the "unity of a thing and its property," etc., in which he finds a "double synthesis," I have noted as transitional between the simple qualitative and the relative judgment.

analysis, but it is a second analysis of the quality already selected. Thus, "That is bluish-green"; "That is grass-green." Here "bluish" and "grass" seem distinctly to qualify green, and to describe the whole only through its greenness. Green here takes the place of the whole as the "subject" of the judgment, so that the assertion is rather a secondary judgment of quality than anything else.

3. We have already noticed that memory and the synthesis of memories form a basis for judgment equally with apprehension. If I can represent a content in a memory-judgment, I can do with it all that I could do if it were a present fact. I can analyse it and describe its qualities, or I can note its relations to other facts. Every such operation, present or remembered, involves a construction or an act of analysis; but so also would it if it were performed on a present fact. As we have seen, memory-synthesis gives us wholes which we could not have presented to us. One case of such wholes may be noticed here in connection with the judgment based on it. Ordinary memory synthesis puts together facts given in continuity; but our constructive activity is not content with these simple syntheses, but will form a conjoint content of any portions of our memory which may in anyway suggest one another. From this arise the subjects of collective judgments and all judgments of number. "The last three Saturdays have been wet," clearly is not matter of immediate apprehension nor of continuous apprehension; but the wetness of each Saturday is given by memory, and the combination of them is a simple construction. Thus numerical and collective judgments have their subjects supplied by construction working on memory. It is different when the word "all" no longer refers to a definite number of recollected individuals, but to an indefinitely extended class. No judgment containing such an idea will be explained from mere memory, or any construction of memories, for it carries us definitely beyond what is either given or remembered into the region of what is to be or must have been. In a word, it rests on inference, and to explain it we must first understand inference. Less obviously, but with equal certainty, every predicate involving a universal conjunction of attributes also involves inference. That X is a man cannot be a matter of immediate apprehension, and scarcely even of memory. For the conception of manhood involves a complex union of many attributes which cannot be present to a single act of consciousness, but which are asserted of the present or past on the ground of their universal inter-connection. Thus so long as judgments rest on the conditions hitherto explained, they would

carry us over a limited field of reality; but just the same factors and processes, which built up these judgments from the facts of apprehension, are repeated, with various complications for data supplied by inference; and thus to treat them once is to treat them once for all. It remains, then, to sum up the forms of assertion which we have hitherto described, and to give a general view of their content and condition. We shall then have a general conception of the character of knowledge in isolation from the factors introducing inference.

4. We have had, then, (a) simple apprehension, (b) analytic attention, and (c) memory. All of these may be regarded indifferently as forms of assertion or as conditions of knowledge. The first two assert the present fact only, and give us truth. The third asserts a content which is not present, and may give us falsehood. As condition (d) of knowledge we have had construction, which in its various operations on the contents supplied by the first three factors produces many various forms of assertion, viz. collective and synthetic memory, comparison indefinite and definite, and, lastly, general ideas. Further, the combination (a constructive act) of the idea with analytic attention to a part of the present, gives us the qualitative judgment, and, when it asserts the relation between some of the individuals to which the idea applies, the comparative judgment; with the same attention to a relation of facts it gives the relative judgment, and with the same applied to the relation of wholes and parts the descriptive judgment. All these judgments concern the present. Again, applying analysis to memory-contents we get the same three judgments concerning the past. According to the construction made of memories and apprehensions, we get plural or collective judgments, which, again, may be qualitative, relative, or analytic. Thus, with apprehension and memory as relatively constant factors, the increasing complexity of the judgment results from the repetition of the acts of construction and analysis. Such being the factors, what is the result so far? Briefly, the knowledge of the order and resemblance of facts that are and have been matters of apprehension. A mind equipped with the methods and forms of knowledge which we have so far taken into account, would, if we suppose it to have applied them with ideal precision and completeness, be in much the same case as if it were able to take a bird's-eye view of all that it had experienced up to any given moment. Of this whole, every element would have been given at some time or other; every part would enter into a continuum, spatial or temporal, or both, and any two or more

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The whole of this account postulates that judgment and belief are concerned with reality. Reality, we have argued, means primarily to the mind the fact that it apprehends, and every one of the assertions with which we have been concerned is formed according to our account either by analysing or retaining what is given, or by uniting different given facts in one assertion. All the assertion we have yet had, then, is either of the present or of what has been present, the only qualification of the latter being that in reasserting facts we tend to take all that has been given as one whole, all or any parts of which we may assert together. It is clear, then, that all belief is concerned with reality, though it is not all true, and there can therefore be no objection to speaking of belief or judgment as a reference to reality. The only mistake to be avoided is the supposition that the contact with reality begins with the judgment. Apprehension is already the assertion of fact, of what is real, and judgment only follows in the track of apprehension. The mind is given reality in the first place, and the whole of its effort so far as we have yet traced it is to retain and to sum up the reality which it has been given.

CHAPTER XI

GENERAL NATURE OF JUDGMENT

ALTHOUGH we have not yet dealt with the higher forms of judgment, we have reached a stage where some of our results may be provisionally summed up, and certain difficulties that have been urged by various thinkers may be considered. Restricted as our view of the judgment has been, it may yet be enough to show us the broad characteristics of that act of thought. For we have in effect explained the essentials of the categorical judgment. It is true that having an eye to the conditions of thinking as well as its content, we have confined ourselves to cases in which the data are supplied by apprehension, memory, analysis, and construction. But the special function of the judgment is not altered by the source from which its materials are derived, and so if we understand what the categorical judgment does with its data in any one case, we understand it in all. Thus a simple assertion like "He is suffering from heart disease," falls outside the classes of judgment that we have been considering in respect of its conditions. Heart disease is a conception that could only be built up by means of a concatenation of inferences, and obviously the symptoms on which the diagnosis rests in the present case are known as symptoms inferentially. But the general content is applied to the individual in the same way as before, though for different reasons. The individual is a case of the general, as before—only the nature of the individual or general contents used is different, and the grounds on which we connect them less immediate. The movement is the same in every categorical singular judgment, and we can now treat of the content of such judgments (apart from their conditions) in general.¹

¹ Much of what we say will apply also to the universal judgment as far as it is categorical, and even to the hypothetical and disjunctive so far as they involve the categorical as an unit. In fact we treat of the categorical judgment *quod categoricum*, and our results will be applicable to all judgment forms so far as they involve the categorical.

We have then to ask, what peculiarities can be attributed to the categorical judgment, or, as we will briefly call it, the judgment, as such? What distinguishes it as a mental activity? What can be said in general of its content?

1. Comparing the judgment with other forms of assertion, it is distinguished at once by the use of ideal contents.¹ If we suppose—as has been supposed in preceding chapters—that it is possible to apprehend the present or remember the past without bringing the contents so given into relation with ideas, then in memory and apprehension we have forms of assertion that are not judgments, and are distinguished from judgments precisely because they do not make use of ideas. And if we deny the possibility of making mental assertions without using ideas, that would not modify our present account, but would be merely another way of saying that every assertion of whatever kind is, in fact, a judgment. Retaining the doctrine of the preceding chapters, we may illustrate the character of the judgment by contrasting it, for example, with apprehension. Thus, I listen to the cawing of the rooks outside my window. This, as I describe it, is a judgment, and a judgment because the present fact is brought under an ideal content. Consider my state of my mind as it is (in thought or in actual time), apart from this subsumption, and we have simple apprehension. The application of the ideal content turns apprehension into judgment. Judgments differ according to the ideas which they employ, and the way in which they assert them. But in all cases they assert in one way or another the content of an idea. Thus the judgments considered in Chapter IX., apply an ideal content to data of memory, apprehension, etc. Here an individual fact is given, and its identity with a general content is asserted by the judgment. In other cases, two ideal contents may be brought into relation. "Twice two are four," "All the radii of a circle are equal," "Honesty is the best policy," assert relations between general contents, without applying them to any particular facts. Or the validity of the idea itself may be the point in question, as in the existential judgment, "Faith-healing is a reality." More will have to be said, and many difficulties may, of course, be raised about these judgments and others; but in this all agree, that they make assertions containing ideal contents, and this it is which renders them at once expressible in a proposition.

Comparing judgment now with the idea itself, we find, amid a multitude of minor differences, two main types of

¹ Ideal, that is, in the strict sense of contents which have become definite and constant objects of reference, and therefore nameable.

theory as to their relations. To begin with, we have the view, partially adhered to by Sigwart,¹ that the essence of the judgment is synthesis,—synthesis of two ideas, or of idea and perceived fact. "Night," that is an idea, not a judgment, not an assertion,—*είναι ἀλλ' οὐκ εἶναι ἰσχυρὸν*,—because not yet brought into relation with any other fact conceived or perceived. "The night is fine," that is a connection, a putting into one of two contents, a *σύνθεσις συνάφαις*; hence there is something asserted, that is, there is judgment. As an exhaustive account of the essence of judgment, this would labour under the defect pointed out by various writers from Mill to Hillebrand, that (a) a synthesis of ideas may remain *merely* ideal, and (b) a given idea, whatever its degree of complexity, may become the content of judgment without entering into any further connections with other contents. As to (a) it is clear that "the fine night" is no more of a judgment than "night" or "fine." To prove (b) much stress has been laid on the "existential judgment"; but needlessly, since the case is clear from other instances. "Liberal victory," "The Liberals have won": the connection may be entertained as an idea, suggested to another as a question, affirmed as a fact, but it is the same connection throughout.

This brings us to the second main theory of judgment, which defines it as the reference of an ideal content to reality, or the qualification of reality by an ideal content. With this definition, as will be clear from what has already been said, we cannot in the main have any quarrel. One point, however, should be noticed. According to our view, judgment asserts an ideal content, and to assert a content is for us to assert it of reality. There is no assertion but is a reference to reality or an assertion of reality. But it would, on our view, be a mistake to regard the judgment as first introducing the reference to reality into the idea. We have seen that an idea may mean one of two things. Either it may be a content, picture, image, or in some other way (if other way there be) presented to the mind. In this case it is simply so much present matter of fact, with no reference beyond itself. Or it is itself as such something suggested of or referred to a further reality. If we take the second meaning, it is clear that the reference is already contained in the idea in whatever form we entertain it, and is not first introduced by the judgment. Here the judgment merely *affirms* the idea. Taking the first meaning, the judgment does not refer such an idea to reality at all, but asserts a reality to which the idea or image corresponds. Thus, "Gibbon

¹ I do not mean that in Sigwart's view this is the whole of the question. For qualifications, see below, p. 152.

formed a very just conception of the character of Julian," confirms a reference to reality already named (i.e. Gibbon's conception); "He is the ideal labour-leader," asserts a correspondence between a real person and an imagined content which may hitherto have remained a mere imagination, without question of the possibility of its being realised. In neither case does it seem quite accurate to speak of the judgment as instituting the reference to reality. Either the reference is already there, or what is asserted is a correspondence between two kinds of real fact, one of which is a mental image.

These qualifications being understood, we may subscribe to the definition of the judgment as the reference of an ideal content to reality. Nevertheless, some connection of contents (one of which at least must be ideal) is so intimately bound up with the work of the judgment, that it may be fairly regarded as of the essence of the matter. Both the form of the proposition and the history of logic are witnesses to this. In the simplest categorical proposition, both terms are significant apart from the proposition itself. That is to say, each designates a certain content, and the effect of the judgment is to bring these contents into relation. Thus in "Balbus is building a wall," the subject Balbus refers at starting to a certain reality, and this reality is connected with that referred to by the predicate. Subject and predicate alike deal with ideas already otherwise familiar, the only *logical* distinction between them being that the subject corresponds to the starting-point of thought, and the predicate to its further movement. Considering the whole process of judgment from this point of view, we find it to be an act in which the mind begins by a reference to a content, real or supposed, given, remembered, inferred or imagined, and goes on to assert its connection with some further content.

2. Now, are these two theories of the judgment compatible? If judgment merely affirms an ideal content, can it also be said to connect it with something else? If it connects it with something else, does it not do more than merely affirm it? The answer is to be found by asking, what idea is it which we are comparing with the judgment? If the judgment be, "It has been raining for an hour," the whole content might be regarded as a single idea. I may suggest that the rain has lasted an hour, and confirm the fact by looking at my watch. From the entertainment of *this* idea, judgment differs merely as assertion from suggestion, and thus taking the whole matter, subject, predicate, and their relation as the ideal content in question, judgment is the assertion that this con-

tent is real. But "raining," taken by itself, is also an ideal content, and this content is connected in the judgment with other facts. Thus, in speaking of the relation of judgment to idea, you must know which idea you mean. Judgment is the assertion of a content which is ideal, or includes an ideal element.¹ This relates the judgment to its total content.² Judgment correlates an ideal content with some other content ideal or perceived. This relates the whole content to one necessary element, which it includes.

In two cases the element of connection seems to fall out of the judgment. The first is that of exclamation, or the impersonal judgment. "Freezing!" "It's lightening!" may be said simply to affirm an idea, or simply to qualify the present, and on this account some would exclude them from the judgment altogether. We have already seen that the form of expression is not decisive, and that in point of fact the process underlying these expressions often differs only in degree of explicitness from the thought corresponding to the formal sentence. We may note here that the difference of explicitness affects the relation of the elements in judgment. Really the data before me, and my thought about them, are much the same whether I say "freezing" or remark, "There is a sharp frost." In either case I have the character of the present given me, and I note its correspondence with a known general quality. These are the elements, and thus the relation asserted; and as soon as the relation begins to be realised, we have the beginnings of judgment. Eliminate the thought of the relation altogether, and we have mechanical exclamation. So far, then, the connection of contents is coextensive with the judgment itself. Where no connection is realised in thought, there judgment fails.

The second case presenting difficulty is the existential judgment. Defenders of the "synthesis" view have insisted that we have here a synthesis of the idea which forms the subject with that of existence in general. To this more than one objection has been taken. Can existence, it may be asked, serve as an idea for this purpose? And if it does, must we not regard other judgments as a double synthesis of subject with predicate, and of both with existence? And, lastly, is it the fact that judgment introduces the idea of existence, or is that already contained in the idea of the subject?

Starting from the last point, we must at least admit its

¹ The whole content is not always strictly ideal. In the simplest qualitative judgment, one element is merely apprehended fact. But it must include, and may be entirely composed of, ideal elements.

² Cf. Bouanquet, *Essentials of Logic*, Lect. vi, esp. p. 103.

possibility. My idea of the ether is not of something non-existent, or existent merely in my head, or, again, "in some place above the heavens" out of relation to other things, but of an imponderable substance diffused in my actual environment. If you tell me "the ether exists," you do not add the notion of existence to the idea I had before. You merely confirm a suggestion. You tell me that that is true which I thought possible. Nor is it enough to reply that existence in the judgment always means some definite kind of existence (e.g. in space and time, as material, or what not); for we should then have to say that the idea forming the subject of such a judgment is really itself a reference to existence of that very kind. The child's idea of a fairy refers to the same real world in which its parents move.¹ The idea is a reference, not only to reality, but to the kind of reality contemplated by the judgment. It would seem clear that it is not synthesis with the idea of reality that turns the subject-idea into a judgment. It is simply the recognition of the suggestion involved in entertaining the idea. In fact, the reference of the ideal content to reality is here the explicit or formal purport of the judgment.

It does not follow that the element of synthesis or relation is absent from the content. For the idea is not only a suggestion, but something that exists on its own account, viz. in the mind of this or that person. The existential judgment refers in its subject to the idea as such, and affirms its correspondence with some further reality. We have insisted that the existential judgment (like others) confirms a suggestion. It is merely stating the same fact in another aspect when we say that it refers to a suggestion as a thought in your mind, and asserts its correspondence with a reality. Thus, "The hypnotic trance is a real state," explicitly affirms an ideal content to be real. This may be broken up in two ways: either (a) "Is the trance real? Yes!" or (b) "The idea of the trance (already in my mind) corresponds with the reality." And (a) and (b) simply represent the same content split up at different points, for the "the trance" of (a) is nothing else but a reference to my conception or someone else's. The existential judgment is, in fact, a case of the judgment which recognizes the truth of some other belief. "What you suppose is true," is much the same as, "The thing you imagine really exists." The existential judgment thus asserts a relation. But the relation is no more than the reference contained in the subject-idea itself—the relation of a mental act to a reality beyond it. Hence this judgment is the

¹ I know a child who wants a pumpkin in order that the fairies may change it into a tram! The mixture of poetry and prose is instructive.

limiting case where the assertion, on the one hand, and the relation into which the idea is brought, on the other, coincide. The element of relation still remains in its content, but it is merely the relation (of reference to a reality beyond itself) already contained in the subject-idea. It would be false to describe this as either a synthesis of two ideas or a connection of two ideal contents. It is simply the affirmation of a reference contained in a single idea. The peculiarity of the judgment is that an idea (as something in your mind or mine) is itself the object of reference in the subject, and then something further is said of the idea, viz. the reference it contains is affirmed. This judgment, then, like others, while affirming an ideal content, still says "something of something," predicates, affirms a relation; but not a relation of two ideas or two ideal contents. In particular, it does not predicate anything of the content which it asserts as real.¹

Hence, if the question be, what is the relation of judgment to idea? our answer must be that an idea becomes a judgment when its content is no longer suggested, but asserted of reality. On the other hand, the content asserted, or some part of it, must, if it is in the strict sense ideal,² be already in some way known—and that is why it can be referred to by a fixed name. A necessary incident of the assertion is therefore a correlation of what was previously known of the content with what now becomes known. Hence the necessary distinction of subject and predicate in the judgment, of which we shall presently treat.³

¹ The existential judgment may be said to establish a reference of one kind of reality to another. We get a close parallel in "Lord Steyne was a real person," "The execution of Bernardo del Nero is historical," for these characters belong to an "ideal world" of their own, and only by these judgments are brought into relation with our ordinary "real" world. They already present the relation of ideal and actual, and should not be confused with "Clive Newcome really marries Ethel," which merely affirms a point left doubtful by the novelist, but refers always (as Mr. Bosanquet says) to the ideal world of Col. Newcome and Lady Kew.

² Ideal contents, we have seen, are normally general, and hence we may speak broadly of the judgment as necessarily implying a general content. But what is actually essential is that the content predicated should be an object of fixed and determinate reference, common to the knowledge of speaker and hearer. This is the case with the individual, which is common to many facts of experience, and many experiences, but is not *bona fide* general. Hence the proper name judgment, "Here is Leeds," "That is Mr. Gladstone," employs an ideal but not a general content.

³ This account, though mainly based on Bradley (*Logic*, bk. i. chaps. i. and ii.) and Bosanquet (Introduction and chap. i.), is not, on the whole, opposed to Sigwart's, to which it also owes much, if we take the doctrine of §§ 5 and 9 in close connection with the insistence (§ 14) on belief in the objective reality of the content. Here, at least roughly, we have all the elements requisite. Brentano's view, adopted by Hillebrand (*Neuen Theorien der Kategorischen Schluss*, pp. 26, 27), that judgment is essentially the *Anerkennung* of an

Our conclusions, so far, may be briefly restated. The whole content of the judgment may *generally* be put as an idea, and from this idea the judgment merely differs as assertion from suggestion. Again, in the content, one element at least must always be ideal, i.e. an object of fixed reference, and so nameable. The content involves a relation of this element to some other, and thus assertions, not involving a relation and an idea, fall outside the judgment.

3. Treating judgment as the acceptance or assertion of an idea, and "idea" as involving a suggestion of, or reference to, reality, we see that the difference between judging and entertaining an idea turns out strictly to be one of modality, and modality enters into the essence of the judgment. The mere idea is the reference simply taken up and entertained by the mind. This is *oñra pára*, not yet an assertion, inasmuch as no specified degree of belief attaches to it. The manner of its reference to reality is so far indefinite. Turn it into an explicit suggestion or assertion, and the difference is just this, that it at once acquires some definite degree of certainty—varying from the maximum of the assertorical judgment to the indifference-point of mere suggestion. To briefly rehearse our points will make the matter clear, and lead at once to our next step. The "idea" as a name for a *content* signifies an abstraction. The content must be *entertained* by the mind in some definite way. To merely entertain it, without any particular degree of belief, is not strictly to make an assertion. Hold it now with some definite degree of belief, and it is the content of a *judgment*, varying in modality from the purely problematical to the assertorical. Entertain it (we may add for the sake of completeness) in some quite other way, and it may be a wish or a command.

Idea, seems to be better phrased, but to come, after all, to much the same thing as Sigwart's *Bewusstsein der objectiven Gültigkeit*, while the dropping of the element of relation as unessential to the content is a doubtful gain. It is thoroughly right, however, to treat the relation as matter of content, and not confuse it with the act of assertion. And Sigwart's reply to Brentano (§ 12, p. 89, note), with reference to the existential form, does not wholly meet the case. It is true that the idea in this judgment is treated as an object of reference on its own account, but it is misleading, I think, to speak of the judgment as itself a *Verknüpfung* of ideas and reality. The *Verknüpfung* with reality is a part of the content of the idea itself. All that the judgment does is to affirm or recognize this relation as true, or, again, reject it as false, and this is precisely Brentano's *Anerkennung* or *Verneinung*. If Sigwart replied that his *Verknüpfung* is not itself a content bearing reference to reality, but what we have called an image, and that its reference to reality is first introduced by the judgment, we should be driven to regard every judgment as uniting the idea of reality with its other contents, and then the normal judgment would be an union of three ideas, and the existential of two only. Essentially the same difference would crop up along with a more cumbrous analysis.

An idea becomes a judgment, then, not necessarily by being asserted with full confidence, but by being suggested with any explicit degree of belief. Full belief is not essential to the judgment, but each judgment is asserted with its own degree of confidence. And this is matter, not only for psychology, but for logic. We shall see more definitely at a later stage that there is a *de jure* degree of certainty, which may or may not correspond with the actual felt certainty with which the judgment is made. This *de jure* degree of certainty we may call the real probability of the judgment,—a probability which is reflected more or less accurately in the mind of the person judging.

4. The indifference-point of mere suggestion is the opposite of belief as such, but is not the only opposite of affirmative belief. The attitude of the mind to one and the same content may pass through the stage of doubt to that of rejection, exclusion, or negation. The negative judgment rejects or excludes the content which the affirmative accepts, and from this point of view negation is the contrary attitude of affirmation. Our treatment of negation must be brief, but a few words will suffice to apply our general theory of the judgment to this case. If we treat negation as negation, this means that we think of it as a particular way of entertaining a content, i.e. as holding it up to the mind only to reject, dismiss, have done with it. Obviously, it is difficult to define such an act as a reference of an ideal content to reality. It is not such a reference. It is the denial of a reference already suggested. The content A - B maintained in the affirmation A is B, is entertained only to be rejected in the denial A is not B.

But negation has also normally, if not always, a positive side. It asserts difference of some kind or another. "Our train is not in yet" is negative in form, and relatively to the suggestion, "Our train in?" remains negative. But it also affirms a positive character of the present. The state of things now before us differs from one shortly to be expected. Nearly all *significant* negations can be translated into some affirmation of a difference of contents; and it is, as a rule, just the mark of a silly negation, as that a parallelepiped is not a monster of iniquity, that no intelligible degree or kind of difference can be affirmed of the terms compared.¹ But it is doubtful whether this rule can be applied universally. It is not always absurd

¹ The so-called "infinite judgment," since it takes mere exclusion as a positive quality, may be said to be the formal expression of this sort of negation, and hence is justly characterized by Hegel (*Logic*, bk. iii. *Werke*, v. p. 87) and Mr. Bosanquet as "idiotic."

to deny a connection between things so remote that no connection between them should be conceivable. "The soul is not an attenuated gaseous substance"—there is a stage of intelligence at which that denial is worth making, however superfluous it may seem later on. Again, "Sea serpents do not exist," may, of course, be translated into, "The nature of reality is incompatible with the existence of sea serpents"; but it is very questionable whether this expresses any real relation of difference. I conclude that negation is normally, but not always, equivalent to an affirmation of more or less definite difference; and the more highly developed, i.e. the more fruitful, the negation, the more precise the difference. But it still remains negative, i.e. it excludes or rejects a suggested content.

5. We have seen that a certain synthesis is a necessary element in the content asserted of reality by a judgment. That you can take a known definite content and say *something* of it, that it has this or that attribute, or stands in this or that relation, is the fundamental assumption on which judgment proceeds. And hence naturally has arisen the division of its content into subject and predicate, with the copula to express their union or relation. That this distinction must be traceable in every judgment seems clear; but where in any case the dividing line is to be drawn is another question, and on this one or two remarks seem necessary.

The subject, in our view, is the starting-point of thought. Such a starting-point may be of any sort or kind, concrete or abstract, real or imaginary, actual or ideal, subjective or objective. It must have some kind of reality, either "in our heads" or outside them; and so much of reality is a presupposition of the judgment rather than a part of its explicit purport.¹ Hence has arisen a tendency to identify the subject with the real *par excellence*, with reality itself, or perhaps substance, "as the most really real" of all things.² And, indeed, on the synthesis view taken by itself it was not altogether easy to see how the reference to reality came in, unless you had your reality already there. On our view there is no distinction of this kind between subject and predicate. S - P forms a whole which is asserted to be real; how far some knowledge of S is presupposed is for these purposes immaterial. The whole is, if the judgment is true, equally real, and to deny the reality of any element would be to destroy the judgment as a categorical assertion.³

¹ For this whole characterisation of the subject, see Sigwart, § 5, p. 28.

² Cf. Arist. *Post. Anal.* A 22, p. 83a, l. 34.

³ I say "destroy," because the denial of the subject may make the judgment

Again, the limits of the subject become on our view uncertain or even arbitrary. It is difficult to say how much is presupposed by the judgment, or from what point the thought process may be said to begin. It is, in particular, far from clear that the logical and the grammatical subject coincide. In "I have lit the lamp," surely "I" is not the point of departure for thought, but rather "lamp," or even "lit." And if you urge that the predication must be expressed by the verb, and in this case the verb is the auxiliary, I must reply that there seem really to be two or three predications in this short sentence, any one of which is as good as any other. For if "I" appear first as myself, and then as the lamp-lighter, the lamp equally appears as itself and as a-light; and once more, if we go back from the sentence to the real thought process, we can with equal force urge that neither of these terms as they stand, but rather the perceived or remembered content, is the true subject of which an ideal content is asserted in the predication. And this is, in fact, the normal case with the judgment. It contains predications several times over, and which of them you take as the predication of the judgment is a matter of convenience. If you say, "He is going down to Yorkshire to-morrow by the 9.45 from King's Cross," you divide "he" as the grammatical subject from the rest as predicate; but the real transition in thought is from what we knew before to what the judgment tells us, and on this principle we might divide the judgment at any point, and should do so if we wish to represent the character of the advance, according to the interest which the statement satisfies—"He," or "going," or "Yorkshire," or "the 9.45," or "King's Cross," may be the real predicate, the real addition to what we knew before. The main point is that this liberty of distribution is rendered possible by the fact that any one of those terms stands in the judgment in a double relation. Of each something is taken as already known, and something is said. In short, the content of the judgment is a complex of interconnected elements, any one of which can stand as subject or as predicate to the rest, the real distinction for thought being determined by the "psychological situation." There is not for any given judgment a logically fixed subject, nor does the subject necessarily take any special logical function (such as providing the reference to reality) upon itself. The whole judgment is a content asserted of reality, consisting of inter-related elements.

To sum up. The whole content of a judgment, in whatever unmeaning rather than false; and I say categorical, because the same denial may leave the judgment a certain hypothetical validity.

way it is entertained, bears reference to a reality beyond the act of judgment itself. This suggested reference is asserted in the affirmative and rejected in the negative, with a certain felt strength of belief constituting the modality of the judgment. This element of belief differentiates the judgment from the mere entertainment of an idea. Of the total content of the judgment, one element at least is ideal as having a fixed meaning independently of the judgment. This element the judgment connects with some further content, real or imaginary, ideal or perceptual; and this connection of elements forms the predication involved in the process. In the existential judgment it is reduced to the relation of the idea to the reality which it itself suggests. The employment of this ideal element differentiates the judgment from ordinary assertion. And the special function of the judgment is to characterise what is given in terms of a system of ideal contents.

CHAPTER XII

THE VALIDITY OF JUDGMENT

So far we have concerned ourselves with the content, and in some degree with the conditions of the judgment. It remains to speak of its validity. In one sense, indeed, it is premature to deal with this question. The validity of any class of judgments or any particular judgment cannot be fully discussed except in connection with the validity of thought in general. But there are certain objections brought against the categorical judgment as such, which we may consider at this stage. If we find them fatal to the judgment, then the question of its validity will be settled once for all; if we are able to dismiss them as unwarranted, then the ground will be clear: there will be no general complaint against the validity of the judgment, and we may consider at our leisure under what circumstances there are positive grounds for maintaining particular judgments to be true. We may arrange objections to the categorical judgment under three main heads.

I. THE DIFFICULTY OF PREDICATION

1. The categorical judgment deals, as we have seen reason to believe, with relations. We may put aside the question whether this is essential to its nature. It is enough that the great majority of such judgments have a content in which subject and predicate may be distinguished as in some way separate and yet related. The total with which the judgment deals is made up of what, for want of a better word, we must call parts or elements, and these elements are so related as to form a total. Moreover, some one of these elements probably forms, more or less distinctly, the starting-point of the thought which goes on to take the rest into account. Hence the essence of the judgment is said to be that it asserts the predicate of the subject. The subject is there to begin with, and then the predicate is tacked on to it. But with this metaphor we are on the high road to a difficulty. For if the

predicate were really "tacked on," i.e. added to the subject by the judgment, that would mean that the subject is altered by the judgment itself. The judgment would add to the subject the predicate which it professes to find in it. Now, clearly this is not the meaning intended by anyone who makes a judgment. When he says, "The rose is sweet," he professes and means to find the sweetness in the rose, not to bring it in from outside. If "sweetness" is not a part of the subject "rose," his judgment is false; he has stated the subject to be something different from what it is. Sweetness, then, must characterise the subject as such. But then what need of the judgment? "Rose," as such, carries sweetness: what need, therefore, to say that the rose is sweet? In short, we are in a dilemma. Either our predicate is contained in the subject or it is not. If it is not, it cannot be true that the subject is the predicate and the judgment is false; if it is, we already have the predicate in the subject, and the judgment is idle.

But at this stage an answer seems pretty clear. The predicate is more than the subject, but is not added to it by the act of judgment. It is some further reality found with the subject in some way or other, characterising or related to it in some manner. It is this which the judgment declares. In short, as we saw at starting, the judgment really deals with a total in which subject and predicate are elements, and its business is to declare this total in its analysed form.

So far so good, but now we come to the citadel of the enemy. Subject and predicate do not stand side by side separate and unconcerned with one another. Grant that we have to deal with a whole which is more than either of them, still the nature of that whole consists in this, that these elements which constitute it are intimately bound up together in such a way that we declare the one to be the other. Grant that in the material before us we have the ground for asserting both S and P, and that in one act of thought, how, nevertheless, can *this* manner of connecting them be possible? Is it conceivably possible to say that S is P, and yet if we are to connect them at all, must we not at some point institute a relation of this kind between two terms?

Certain thinkers have held the connection expressed to be impossible and absurd.

"This absolute connection of two concepts S and P, in which the one is unconditionally the other, and yet both stand over against each other as different, is a relation quite impracticable in thought; by means of *this* copula, the simple 'is' of the categorical judgment, two different contents cannot be connected at all; they must either fall entirely within one

another, or they must remain entirely separate, and the impossible judgment, 'S is P,' resolves itself into the three others, 'S is S,' 'P is P,' 'S is not P.' We must not stumble too much at the startling character of this assertion. Our minds are so constantly making categorical judgments of the form 'S is P,' that no doubt what we mean by them will eventually justify itself, and we shall soon see how this is possible. But the categorical judgment *requires* such a justification; taken just as it stands it is a contradictory and self-destructive form of expression, in which the mind either represents as solved a hitherto unsolved problem, the determination of the relation between S and P, or so abbreviates the discovered solution that their connection is no longer visible."¹

If this passage meant only, as certain expressions in it might suggest, that we should not be guided in interpreting the categorical judgment by the mere form of expression, but by attending to the actual relations which we intend to convey by means of it, we should have no objection to urge. But there is more intended. The tendency of the categorical to fall back into a mere identity-judgment becomes irresistible, according to Lotze, when it takes quantitative form. Take the particular judgment (§§ 57, 58), with its "Some men are black." What is intended here by the subject? Not all men, not any section of men taken at random, but black men only; and our judgment, in fact, runs, "Some men—viz. black men, are black." We have tautology obvious and confessed. And now that we have the cue, we can apply the same method to any categorical judgment. The dog drinks; yes, but only the drinking dog, the dog while drinking. Caesar crossed the Rubicon; but not all his life long, only while he was crossing it. The categorical judgment is either tautologous or absurd.

But this argument depends upon a subreption. You have the judgment before you in its completeness. Its effect as complete is in some way to define or characterise the subject. But the subject must (if your judgment is true) have, in fact, possessed this character all along. Then you take the subject as already for you, and apart from the judgment, including that characteristic; and then you find the judgment to be identical. In short, you take what the judgment has done; you claim that it was done already, and then you cry out that the judgment is nugatory. Having robbed it of its content, you complain that it comes empty-handed.

But, it may be said, if we take Lotze's example we shall be constrained to admit his analysis. "Some men are black—

¹ Lotze, *Logic*, bk. i. chap. ii. § 54.

what men? Negroes, black men. You must know which the black men are before you can say that any are black, and so the "some men" means for you precisely the black men. This argument rests on a confusion. Of course the individuals referred to in subject and predicate are numerically identical; but subject and predicate do not either apart from or in the judgment mean the same thing. There are certain individuals whom the subject indicates by the general qualities of manhood. Another quality, that of colour, blackness, is now asserted of these individuals. In the subject alone this quality is not assigned: it is united with the other qualities by the predicate; and now, the judgment being complete, we can roll its whole content into one complex term, "some black men," and say that this is the reality to which we are referring. But our knowledge of the Reality is formed, and our reference to it determined, by the judgment itself. In short, our first fallacy is that which we may call the "ambiguity of the subject." So far as judgment analyses a whole, there is always this opening for error, that the whole does not acquire its characteristics by means of the judgment, but has them all along. The act of judgment is the recognition of these characteristics. It starts from the unanalysed whole as subject, and results in knowledge of the whole as analysed. This is the progress it makes; but now, when the judgment is familiar, the subject has come to mean all that analysis has found in it, and it is difficult for the logician to separate its two meanings—its meaning as it stands before the judgment, and its meaning as the judgment has extended it. But it is precisely on the separation of the two that an understanding of the work of judgment rests. It is just the same if we think of judgments as synthetic.¹ We learn that A is B, and then A comes to mean to us A B, and now the original judgment seems idle.

Thus, to illustrate by a well-known example, "Body has extension," has seemed a typical case of the identical judgment. Surely body means precisely the extended, impenetrable, etc. "Extension," therefore, is, as Kant held, included in body, and we have said, in effect, that extension is extension. But this is not a fair analysis. Body is known to us by other properties, e.g. by its resistance. Resistance and extension are not the same content; and to state that what resists has always extension, is to assert something definite and distinct about resistance. Now let us, for argument's

¹ Personally I follow Mr. Bosanquet in regarding all judgments as at once synthetic and analytic. I only distinguish the two aspects here in order to exhibit a particular relation from different points of view.

sake, suppose that body is, in fact, to be truly defined as that which has resistance and extension. Then the proposition body has extension may have one of two values. Either it may represent a state of thought in which body has been identified with resistance, and which now attaches extension to resistance as a fact that is inseparable from it; or more probably body represents the unanalysed element which is always present in consciousness in certain perceptions or conceptions—an element relatively to the concrete whole of thought, but a whole relatively to its own parts. Body being such a whole, is analysed into extension and resistance, and the judgment "body has extension" represents one half of this analysis. Now here, body and extension are not the same contents, nor does body include extension. For it expresses something relatively vague and unanalysed, while extension is a definite content which the actual judgment finds to be a characteristic of the whole in question. Complete the analysis, and say, "Body is that which resists and is extended," and still we have no equivalence. Body means the unanalysed impression, extension and resistance its relatively definite attributes, and the assertion is that these attributes characterise the whole given. Now, when this process of analysis has once been performed, the equivalence is retained by memory, and, what is more, the mere assertion of the whole suggests the elements. To say "body" is now virtually to say "extended and resisting," whence to repeat either of these words appears tautological. In fact, it is no more tautological than the repetition of anything else which we already know. It is tedious to announce that Queen Anne is dead, but it is not *on that account* tautologous. No more is it tautologous to say that body is extended. Body has come to suggest extension, but it means primarily an unanalysed content not yet known as involving extension. Similarly, Queen Anne had a life and character of her own, was, in short, somebody while she lived; and whether I speak of abstract body or of Queen Anne, how much the mere mention of the words suggest to me of what I have learnt of them is mere psychological accident. When I say that the one is extended and the other dead, I take their primary content and assert of it a further content which has come to my knowledge.

We may conclude that in every categorical judgment, subject and predicate express aspects of the whole which are in some degree distinct, while the judgment itself recognises the whole as containing these aspects in some kind of union.¹ There may

¹ Lotze himself makes two admissions, which bring his view nearer to that urged in the text. He speaks (sec. 58) of a judgment which, identical as to its

be mental acts which predicate mere identity. There are such acts; every circular definition is an instance; but they are not judgments, they are simply the verbal expression of an attempt to make a judgment which has failed.¹ Verbally they may differ little from real judgments—

"To the West, to the West, to the Land of the Frog,
Where the mighty Missouri rolls down to the sea;
Where a man is a man, be he never so poor,
A window's a window, a door is a door."²

The third line contains a famous judgment formally, but not really tautologous; the last line two genuine tautologies, intended by the similarity of form to discredit the foregoing. But the study of identical judgments belongs, together with tautology, not to logic, but to the pathology of thought.³

2. But, after all, it may be urged, we have not touched the real point. No doubt the judgment means to assert something

matter, yet "regards the same object from different aspects." But here is the fact of difference admitted. That an object known under one aspect has another also, can be no mere tautology. Again, see 56 the judgments considered "no longer assert any mutual relation between the parts of their content, but only that this content as a composite whole is a more or less widely extended fact." This would seem to admit the judgment to be a real assertion, but it is explained that the elements S and P, though both asserted are not asserted as in any definite relation. The truth contained here is, that the judgment may be regarded as merely the recognition of a whole which is otherwise only suggested or ideal, and that, as merely ideal, we may have S and P already suggested. But it would be untrue that S and P are not judged to be definitely related. Where P, for example, is a characteristic of a whole S, the relation, however indubitable, is distinct from any other. If Lotze means only that "the categorical judgment does not exhaustively define the relation involved," no objection can be made, but it seems strange that he should find a fuller statement of the relationship in the hypothetical judgment (see 60). It is true that the relation S - P must have a ground, and that the need of this is explicitly recognised in the hypothetical judgment, but to give the ground of the relation is not to define any more clearly what the relation is. If "S is P" is meaningless, "S as Q is P" cannot be one whit more intelligible.

¹ This is pointed out with force and some humour by Hegel (*Wissenschaft der Logik*, bk. ii. *Werke*, vol. iv. p. 34). We have experience of the pure law of identity, he says, "only too often." But if you treat "the Plant is a Plant" as a judgment, you can only say that it contradicts itself, because it sets out to say something about a plant, and ends by saying precisely nothing.

² A word may be added to clear up the relation of tautology to the statement of familiar facts. It was at one time suggested that the whole question of identical judgments was relative. A is B was identical for me if I knew it already, and not for you if you did not know. But this is inaccurate. However much A suggests B to me, however surely when I begin with A, I must fill out the whole idea AB, the elements referred to by A and B remain distinguishable, and in the judgment I recognise their distinctness as well as their relation. For the most, the assertion of what is familiar differs no doubt in its psychological character from the becoming aware of new matter. It is an act of reference to something already asserted, instead of a fresh assertion. But logically this reference involves the distinction of truth and falsity, i.e. involves what we have meant all through by assertion.

of the subject not contained in the subject as such. But much as it wishes this it cannot achieve it. A is A, and is not B. "A window's a window," and that is all you can say of it. Thus Mr. Bradley tells us¹—"If you predicate what is different, you ascribe to the subject what it is *not*; and if you predicate what is *not* different, you say nothing at all." We may reply that we predicate that which the subject really is, but is not apart from the predication known to be.

To explain this, let us recall the analyses already made of certain judgments. And, first, let us remind ourselves of a principle of interpreting propositions already suggested: I mean, that we should not come to the examination of the question with a ready-made theory of what any of the terms used, for example the copula, must mean; but that we should take the sentence as a whole as an attempt to symbolise some content of thought, and that we should determine the character and validity of that content by reflecting upon it rather than on the words by which we are aware of more or less adequately expressing it. On this method we start from the thought, and proceed from it first to the sentence—the true unit of language—and only so determine the logical value of single words, so far indeed as such dead fragments of language can be said to have any definite value at all. We may be told that this is a *petitio principii*, that we ought to determine the relation asserted in predication from the obvious meaning of the copula, instead of determining the meaning of the copula by reasoning from the relation asserted. But, we may ask, how does the verb to be acquire its meaning or meanings? I imagine that it, in its turn, is a general term which you and I for our part did not invent, but which we picked up and learned to understand from the use we heard made of it by other people. When we learned to use the word, I imagine that we recognised the relations which other people expressed by it. We learned, for example (if the above theory of the qualitative judgment be correct), that "This is green" asserted a quality of the given, and "This is not yellow" denied one. The only way in which the words could get any meaning for men would be through their noticing the relation they were intended to express, and I suppose that the words originally came into use as this relation became clear to men. I hold, then, that whether any account we have given, or may give, of the actual content of the judgment be correct or not, we are right in point of method when we reason from the relation asserted to the meaning of the copula. It would, no doubt, be equally sound to reason from the meaning of the

¹ *Appearance and Reality*, chap. ii. p. 20.

copula if that were the more easily ascertainable of the two. It is simply a question of which of the two is the more easily known, and in view of the history of logic it is at least clear enough that the meaning of the copula is not known very easily. We may go a step further. When we are asked what precisely is asserted in predication, we may in a certain sense protest against the question which invites us to break up what is actually asserted as a single whole. However, inasmuch as we can distinguish elements within the content, it must be possible to divide it, however arbitrary the assignment of this part to subject and that to predicate may remain. Thus in the qualitative judgment we may say, to begin with, that the given content as first apprehended is the subject, and that what is predicated is the attribute detected in it by analysis. Or we may prefer to put it, that the analysed whole is our subject, and that what we predicate of it is correspondence with our idea, or that it is an instance of a general content. It is only (as we have seen above) a question of how much we take for granted as included in the meaning of the subject, and where, accordingly, we mark the beginning of the addition made by the judgment. What we really assert is the whole, which includes all these terms; but the whole consists of elements interconnected by what we may call the predicative relation, and whenever we have elements so connected we may call one of them subject and another predicate.

What, then, are the relations which we endeavour to state when we predicate, that is, when we say that something is something else? Briefly, they may, I think, be reduced to two main types, corresponding to what is commonly called the movement of analysis and synthesis (or construction) respectively. Let us take these separately, and consider what is asserted in each case. In the first case we claim to be dealing with a whole which is first given as *M*, and in which we subsequently find the character *P*. Looking at a stone I first notice (say) its size and colour, and then its granulated appearance or the roughness of its surface. Now we may put this result thus. We may say, what is *M* is also *P*; that which is so big and is of a greyish colour, has also a rough surface and a granulated appearance. That is to say, we have before us a reality *S* (the stone), which is first known as *M*, and becomes known as both *M* and *P*. Nor does it much matter whether *M* and *P* are two distinct qualities of *S* (as its size and colour), or whether *P* is a further determination of the quality *M* (as a peculiar shade of grey). In either case we begin by asserting *M*, and end by asserting the whole *M*-qualified-by-*P* or

M-combined-with-P. In either case the recognition of P is an addition to our apprehension of M; but in neither does P fall outside the whole which is M; what is M is also P.

But, it will be said, M is not P, it is M; and we knew this, and hoped to get out of it by resorting to an S which was not in the original judgment at all, and substituting for our original M is P the more plausible "What is M is also P," or "S which is M is P as well." We may reply, that we introduce S into the matter precisely to emphasise the ambiguity upon which this objection rests. M, it is true, is not P, if by M you mean those characteristics first apprehended. Thus, if M is the figure, it is not also the colour; or if it be the general tone of colour, grey, it is not the peculiar tint of colour, light grey. Taken in this way M is not P, nor is it ever asserted that M is P. But if M be taken as a name or symbol for the whole reality present, it is P. If M be the whole content as seen, it is both of a certain figure and of a greyish colour. If M be the true colour, it is precisely a particular shade (P) of grey (M). This is the ambiguity of M; and this is why we introduce the fresh symbol S; S being the name for the whole reality present when the operation of analysis is completed,¹ which is the union of the broad characteristic first known (M, the subject) with those more special attributes detected by analysis (P, the predicate).

Still it may be said a contradiction remains. You say that S is both M and P. But M is other than P, different to P. S is P and yet S is other than P, and that is a contradiction. This is an ingenious puzzle, but could hardly deceive a child. It comes to this. You take "is" as = "is completely identical with." You then interpret S is both M and P to mean, S is completely the same as M and as P, but M and P are different; then you get a contradiction. But if "is" means "is in one respect" = has an element, the contradiction vanishes. S has different elements M and P in its total content. Here, then, we have the meaning of the copula in this kind of predication. It expresses that relation which we call attributive. Every whole of apprehension has various characters, and predication expresses the qualification of the whole by these characters. You may say this is no explanation but only a name, and we shall reply that we did not set out to explain, but merely to indicate, the kind of relationship in question. Our question is, whether the relationship is a fact or whether it is self-contradictory; and our result is that it is a

¹ Here as elsewhere the ambiguity mainly comes from applying the same name or symbol (α) to the reality with which the judgment deals as a whole, and (β) to the element of it referred to by the subject as such.

relation which appears in every fact of apprehension, and which is only made to seem inconsistent by destroying the meaning of the terms used to express it.¹

Take, now, the second case. A and B are different facts, but "we bring them into relation." A is like B, or before B, or to the right of B. We predicate of A now, not B, but its relation to B. But how can we do this? Is A a mere relation to B? Is lightning merely that which is before the thunder? Is your photograph merely a relation of likeness to you? Clearly not.

We are predicating of A something different from A. Precisely; that is what we are doing, and that is just why we are right. Our assertion takes into account, not A only, but B, and considering A and B together finds them in the relation C (of correspondence, resemblance, difference, or what not). Now as regards A, we might take its relation to B as one of its characteristics, and so far the solution of the difficulty would be as before. Or if, objecting to view a relation as characterising one of its terms, we say that it either characterises or consists of the two taken together, the ultimate result will be identical, though we have shifted the point of predication. Our subject is now really the two terms A and B, and the relation is asserted as holding of them, or characterising them as taken together. The relation of A to B is a characteristic of A and B as a whole for perception or thought. Once again we are predicating a character of the whole which it qualifies.²

¹ We may put the case briefly in either of two ways. We are dealing with a whole first given as M, which in reality has a character P. We do not in our first apprehension of M, detect this character as a distinct element; the judgment on this side is the act of analysis whereby P is distinguished. P-qualifying-M, the content of the assertion, is more than M as the content of the original apprehension, though it is the same reality first known as M, and now more fully as M-qualified by P. Or, more simply, we are asserting a whole reality S of which at first certain general characteristics M are apprehended, and then a special character P, and we assert that particular union of them which we describe as the qualification of M by P. P is not a separate fact beyond the whole reality which it qualifies, but a distinct element in it, distinct from other characteristics M. Again, the element M is not the element P, but the two form one whole.

² Mr. Bradley (*loc. cit.*) objects to predicating the relation of both terms, "For if you mean that A and B, taken each severally, even 'have' this relation, you are asserting what is false. But if you mean that A and B in such a relation are so related, you appear to mean nothing." I must confess that this argument seems to hit the nail on both sides, and precisely to miss the head. If, first, the relation is of any definite character, A and B as your subject are precisely not as yet apprehended in "such" a relation. They are considered together, and the product of this consideration is that they are characterised as standing in "such" a relation. As subject they are considered neither (a) separately, nor (b) as yet in the relation predicated, but (c) simply together, in what relation the judgment determines. If, secondly, the "rela-

3. We may readily apply these results to any of the judgments analysed. Take the qualitative judgment, take it in any stage of its explicitness, and put the predication-puzzle at whatever point you like, and the result is the same. First take the subject as being the apprehended content *M*, and the predicate as the qualification *P* attributed to it. Here we have the analytic or attributive relation. *M* as *P* is something more than *M* merely known as *M*, and yet it does not cease to be *M*. The attribution of *P* is a further determination of the content first given as *M*, but one which does not contradict that first apprehension.

Now take the judgment as expressing conformity to an idea, whether correspondence with my idea as a subjective fact, or resemblance to the other instances of the general content: let the conformity to the idea bear the brunt of the difficulty. The position is now, that the character here detected (subject) corresponds to a certain idea expressed by a name (predicate). Here we may say the point is that the single fact stands in two relations. We have what has been somewhat vaguely and awkwardly called an identity in difference. The single fact is this character *X* of the present. It is related to my consciousness as apprehending, and to my idea of *X* as such. Now, how can one thing stand in two relations? Well as easily, we might suppose, as it can stand in one so long as there are two things for it to be related to. But how can it stand in one? Because together with some other fact (here my subjective idea to which it corresponds, or the other "instances" which it resembles) it forms a whole of such and such a character.

The "equivocation" of the subject is nowhere more apparent, or at first sight more puzzling, than in the analytic (or constructive) judgments¹ which equate the whole with the sum of its parts. $A = a-b-c$, or $a-b-c$ constitutes *A*: it does not matter in which order we take them, nor whether *a*, *b* and *c* are separately apprehended contents or elements in the single

tion" between *A* and *B* is simply an expression for the fact that *A* and *B* form some sort of whole, whether for perception or for thought, then as *subject* *A* and *B* are taken severally, and the thought precisely consists in bringing them together, i.e. into a whole. *A* and *B*, hitherto separate terms, are seen to form a whole. The fallacy here is in the first stage of the argument. It is doubtless false that *A* and *B* are taken together in as far as they are taken severally. But *A* and *B* which have been taken severally, and which remain distinct, may come to be taken together, and that is what happens to them in this judgment. Relation is a very vague term applicable to any kind of "togetherness," or to any definite characteristic of a whole of elements. Mr. Bradley's *simplex reus*, I think, on the lumping of all these senses into one term.

¹ I use these terms here for the Descriptive Judgment in its ideal forms (cf. p. 141).

content A. In either case we have a whole on one side and parts on the other, and the question is, how can the whole be distinct from its parts taken together; or, if it is not distinct, how then can there really be any assertion? And the answer is this, that the whole is *not* distinct from the parts taken together, but it is precisely the taking them together and yet as distinct parts which constitutes the assertion. A whole consisting of elements, elements forming a whole, is the content of the judgment. When we divide the judgment into subject and predicate we analyse this content; and if we take either term alone, we are forming an abstraction, and this, like other abstractions, is in danger of having no meaning, or no definite meaning, apart from the whole. Here, as elsewhere, the subject, in fact, expresses the aspect of the whole content to which attention is first directed, and from which we may say that assertion starts. It does not express a content which remains unmodified by the judgment, but rather the first appreciation of a totality the nature of which is brought out more and more fully as the judgment goes on. But throughout (and this, I think, holds of all judgments) the assertion is of one whole, all parts of which are inter-related. Thus the judgment may start with the relatively indefinite whole, and develop the distinction and inter-relation of its parts; or it may start with the parts as *prima facie* distinct, and bring out more clearly their inter-relation. In either case the reality contained by the completed judgment is more than that to which the subject refers as already known. In either case, when the judgment is completed, subject or predicate taken alone come to *mean* the whole reality. Hence in either case this equivocation (between the meaning of the terms as applied *before* or *after* judgment) can be used to introduce a puzzle. But in no case does the subject refer to the parts as taken together, or to the whole as distinguished into elements, but the taking together or the distinguishing is the work of the judgment itself. In no case, therefore, does the judgment assert a simple identity. Its total content is always more than that of any of its terms, and either term as compared with the other represents just this development.

I conclude that the relation expressed by the categorical judgment, so far as it may be regarded as the attribution of a predicate to a subject, expresses the real character of genuine contents of apprehension or thought. That, briefly, the character so expressed is the actual complexity of the qualifications of such contents, the qualification of single wholes by many distinct attributes, and the constitution of wholes by the

inter-relation of distinct parts. Lastly, that the progress or advance of thought represented by the judgment (in this relation) is the analytic or synthetic movement by which such wholes are elaborated or built up. As expressing such genuine thought I take the categorical judgment to be valid.

The identity fallacy, in fact, depends on a confusion. I have a content A which I wish to recognise or assert; and I say "A is" or "A exists." Now here I mean, must mean, ought to mean, A, all A, and nothing but A. Hence the term "is" is a sign for the assertion of the content which stands as its grammatical subject in its whole nature and its exclusive nature. This meaning is still associated with the term when a grammatical predicate is added to it. And here is the fallacy. In the new sentence A is B, the copula is part of a different whole, and therefore has a different function. In fact, it has now a double function. On the one hand, it indicates the relation of A and B, on the other it is still as before the sign of affirmation or recognition of reality, only the reality now recognised is that of A - B. But the two functions become confused. Instead of merely connecting A and B, and affirming the whole A - B, the copula is taken to affirm A to be B in the sense in which it originally affirmed A, i.e. it is taken to mean that A is B in the sense in which A is A. And any other predication is taken to be impossible. Hence, though I can affirm A to exist, I cannot affirm A - B. But in point of fact, as we have seen, the copula does not identify A as such with B as such, but develops A's nature by the newly distinguished mark.¹

¹ According to Hegel (*Wissenschaft der Logik*, part III. *Werke*, vol. v. pp. 74 ff.), the positive judgment (the first form of the *Urtheil des Denkens*, which also may be called the qualitative") is to be thus analysed. Its form asserts "that the individual is the universal." Its content that "the universal is the individual" (for in "the rose is sweet-smelling," sweet-smelling is only one of the many attributes of the rose; so that rose is as an universal to "sweet-smelling" as individual). Both these relations are, however, impossible. "The individual is universal. But rather such an immediate individual is not universal. Its predicate is of wider extent, and so does not correspond to it" (p. 79). Similarly, the subject as a plurality of properties is "therefore not such an individual property as its predicate expresses." Hence we are not surprised to hear "both propositions must therefore be denied, and the positive judgment expressed *generally* rather as negative."

If Hegel chooses to manufacture a purely fictitious mode of thinking and call it the positive judgment, I suppose he has a right to do so; and if it interests him to exhibit the contradictions in which such a mode of thinking would be involved no one can object. But when he instances such judgments as "The rose is red," "Cicero was a great orator," as examples of this mode of thinking, we must put in a protest. The categorical judgment, as we actually make it, in no way corresponds to Hegel's "positive judgment." Its subject is an individual and its predicate is an universal, and it asserts some relation between them, but this assertion is simply caricatured when it is taken to mean that the individual is the universal. What it actually says is that this individual has an

4. One further caution remains to be set down. On our view of the judgment the reality with which it deals may be held to be "transformed" by that "combination" of contents which forms the judgment. The reality to which the subject refers is, in some respect or other, differently conceived at the end of the judgment. The S which we only knew as M we now know as M-P or M with P. But it would be a very great mistake to infer from this that thought either (α) "transforms" the reality about which it thinks, or (β) the contents which it uses, or (γ) that its action on those contents is such that the higher phase of thought is necessarily in any sense a contradiction or even an *Aufhebung* of the contents of its lower phases. For (α) the reality thought about is the same all along. It was S and will be S; only we first knew it as M, and now know it as M-P. And (β) the subject M is the same all along, being the expression of some aspect of S. Because that aspect is further conjoined with P, or qualified by P, it does not cease to be M. White does not cease to be white because it is the colour of a square or a circle, nor because it is bright or dull. Take M strictly, and decide what you mean by it, and you will not find its meaning altered for you by the judgment as such. The two inferences we are combating rest on the same confusion. They take M first as one aspect of the reality—the aspect first thought of—and then as the whole reality to which that aspect belongs. Once more, the whole reality dealt with is identified with the subject, and then both subject and reality appear to be transformed by the judgment. Lastly, (γ) in whatever sense our conception of the reality to which M belongs is modified in the judgment, the modification is not

attribute resembling attributes found in other individuals. In this there is no contradiction. But Hegel, availing himself, not for the first time, of a somewhat plausible confusion, treats the universal as meaning (*a*) this instance, and (*b*) all the instances. This red colour may be called "an universal," as being something which resembles the red seen in other things. Similarly "red" is an universal, as that which is realized in many things. When these two senses are confounded, we get the result that "this instance of redness is every instance of redness"; and this must obviously be denied, since "the predicate is of wider extent than the subject."

The content of the judgment (that "the universal is the individual") is made contradictory by the arbitrary interpretation of the copula against which we have protested. The subject as a plurality of attributes (hence by an abuse of terms called the universal, is one single attribute. This is so put as to make the judgment appear to assert that the rose is one of its attributes in the sense in which it is all of them,—an interpretation which is simply devoid of ground.

The singular judgment is treated in much the same way as the positive. (See p. 91, "This is an essentially universal." "But a This is not an essentially universal," and so on.) The "categorical" judgment is differently treated. But it is classed among judgments of necessity, and does not here concern us. (See *op. cit.* pp. 93-100.)

normally such as to contradict the reality of M.¹ Socrates does not cease to be wise because he is an Athenian, or because he is "snub-nosed." Thought moves not by contradicting, but by supplementing the results already achieved.²

II. QUALITIES AND RELATIONS

5. But now a second question arises. Granting the difficulty of predication as such to be overcome, how have we overcome it? By assuming that you can in some way distinguish qualities within a content, and assert them as qualifying the content. Our solution, then, rests on the conception of quality and its relation to the given. But here two further difficulties have been raised. Is the conception of quality self-consistent and possible? and, secondly, is the predication of a quality consistent and possible? I begin with the first problem.

"Qualities," says Mr. Bradley,³ "are nothing without relations. . . . Whenever you take them so, they are made so, and continue so, by an operation which itself implies relation." For "in the field of consciousness, even when we abstract from the relations of identity and difference, they are never independent. One is together with, and related to, one other at the least,—in fact, always to more than one." There may be some lower state of mind containing one feeling of many aspects. But these aspects, if they "are to be called qualities at all," are so only for an outside observer, and for him they are at once "given as aspects—that is, together with relations." In

¹ Of course our conception of the subject may be inadequate to the point of incorrectness, and then a new predicate may actually reverse it in some respect. Stallo's examples (*Concepts of Modern Physics*, p. 136), "Hydrogen is a metal," "A whale is a mammal," perhaps fall into this class.

² This last discussion refers to the able paper already noticed by Mr. Bosanquet. In the account in the text the "combinational" and "transformational" theories seem to join hands.

A clear distinction should, I think, be drawn between the "transformations" of its data effected by thought in the judgment on the one hand, and in perception on the other. In the first case the data remain as objects of consciousness and as facts, and all that the "transformation" comes to is that the whole which they form is not of the nature of a "mechanical" combination, but involves a qualification of the one by the other. It does not "alter" the apprehended fact. In the second case (alluded to in Chap. I.), thought by acting on attention (or in whatever way) does modify the apprehended fact itself, i.e. the same physical stimuli would give us a different fact but for the operation of thought. In this case thought actually modifies the reality presented to us, and the supposed "data" on which it works are not objects of consciousness at all, but physical stimuli. This operation must not be taken as the normal action of thought in the judgment.

³ *Appearance and Reality*, chap. iii. p. 26. The whole passage deserves reading, but is too long to quote, except in fragments.

short, you are in a dilemma. Either you have unbroken feeling, and then you have "no relations and no qualities," or you have distinct qualities, and then at once you have relations.

Qualities, then, imply relations. But so in turn¹ do relations involve qualities. How can there be a relation without something to be related? How (here Mr. Bradley knocks one modern fallacy on the head) can a relation "precipitate terms which were not there before"? Clearly you cannot start from the relations as primary and self-subsistent.

But now take qualities together with relations. Are they thus any the more intelligible?² Not a whit. The quality now "has a double character as both supporting and being made by the relation. It may be taken as at once condition and result, and the question is as to how it can combine this variety. For it must combine the diversity, and yet it fails to do so. *A* is both made, and is not made, what it is by relation; and these different aspects are not each the other, nor again is either *A*. If we call its diverse aspects α and α , then *A* is partly each of these. As α it is the difference on which distinction is based, while as α it is the distinctness that results from connection. *A* is really both somehow together as *A* ($\alpha - \alpha$). But (as we saw in Chapter II.) *without* the use of a relation it is impossible to predicate this variety of *A*. And, on the other hand, *with* an internal relation *A*'s unity disappears, and its contents are dissipated in an endless process of distinction. *A* at first becomes α in relation with α , but these terms themselves fall hopelessly asunder. We have got, against our will, not a mere aspect, but a new quality α , which itself stands in a relation; and hence (as we saw before with *A*) its content must be manifold. As going into the relation it itself is α^2 , and as resulting from the relation it itself is α^2 . And it combines, and yet cannot combine, these adjectives. We, in brief, are led by a principle of fission which conducts us to no end. Every quality in relation has, in consequence, a diversity within its own nature, and this diversity cannot immediately be asserted of the quality. Hence the quality must exchange its unity for an internal relation. But, thus set free, the diverse aspects, because each something in relation, must each be something also beyond. This diversity is fatal to the internal unity of each; and it demands a new relation, and so on without limit. In short, qualities in a relation have turned out as unintelligible as were qualities without one. The problem from both sides has baffled us."

¹ P. 32. I am not adhering to Mr. Bradley's order.

² P. 30.

We may, I imagine, sum this up pretty much as follows:—Relations presuppose qualities. Qualities presuppose relations. Neither can exist independently, nor yet can they exist together; for in such a whole the relation must depend on qualities, and these on some anterior relation which again depends on qualities, and so *ad infinitum*. We can never get to a starting-point.

6. Again we seem to be in a dilemma; but again I venture to think that the alternatives presented to us are not exhaustive. We have two terms under consideration. Of these it is suggested, either (a) one or both must be independent of the other, or (b) each presupposes the other. Alternative (a) is excluded, and the impossible (b) remains. But is there not (c) the possibility that two terms may be mutually dependent without presupposing one another. Take, for example, two aspects formed by analysis of one whole. Neither of these can be real apart from the other, yet there is no logical or temporal before or after. There is mutual implication without any need that the reality of the one side should be substantiated apart from the other. It may turn out that this is the case with qualities and relations. But I must first remark on the anterior question how far it is true that qualities imply relations at all.

We saw reason to insist in Chapter I. that the apprehension of the present did not as such depend on or imply any relation of the present to other things. The apprehension of the present is not the recognition or thought of its relations, nor does it involve any reference to them. I need not dwell on this again, since Mr. Bradley seems to admit at least its possibility. But, he says, granting such a lower state of consciousness, we cannot regard its content as a quality. If a quality at all, it is only so for our higher consciousness which distinguishes or compares, i.e. relates it.¹ Is there not, we may ask, a little confusion here? The content apprehended is (as the superior consciousness knows) a quality. But apprehension itself does not know this. We express this fact somewhat ambiguously when we put it that the content is not a quality for the apprehending consciousness. This really means—does it not?—that apprehension does not know it to be a quality, does not look on it as a quality. It is liable to be taken as meaning that the content has two sides, or is even self-contradictory; that as showing itself to apprehension it is not a quality, while as grasped by reflection it is a quality. We may put it then, to avert this

¹ I conceive this to be the gist of the passage already quoted, pp. 26, 27.

confusion, that the very contents which we subsequently know as qualities are given in apprehension, i.e. apart from relations. Or, what is the same thing, qualities are given apart from relations, though the conception that they are qualities depends on relation. It is the fundamental postulate of knowledge that the fact is never altered by becoming known.

But however originally given, qualities are at length known or conceived as qualities, and the question is, can we justify that conception? When I think of blue as a quality, what does my thought imply? Well, it implies, for instance, that I can distinguish the colour of a substance from its figure: that I can compare this colour with that, and note resemblances and distinctions. All along the line, as Mr. Bradley has insisted, my thought is involved in relations. I cannot know blue as a general content, i.e. a quality, without, e.g., distinguishing it from green. The fact, then, that blue is a quality depends, *inter alia*, on its distinction from green, and "distinction from" is one sort of "relation to." But, again (to remind ourselves of the circle), this distinction is impossible without the knowledge of blue and green. Then what are we to say? It cannot have been blue as blue that was originally the basis of the distinction. If we suppose a single real content which we now call blue, we must put it that the blueness is the result of the distinction, while its basis was some other attribute. The content A, which we thought simple, splits up (as Mr. Bradley puts it) into α the basis, and α the result of the distinction. But then what is the quality? Is it A or α or α ? Well, it may be said α and α both characterise A. Then they are qualities; and how are they known? once more, by relation to A. Then what are the terms of this relation? You must split up your content again, and so go on indefinitely.

To this we may reply: granting A to be knowable as a quality only in relation to B, the relation A—B is constituted, not by α and β , analysed aspects of A and B, but by A and B themselves as such. It is difficult to say anything universally about so abstract a term as "relation," but we may perhaps hazard this—that when two terms are inseparable (in fact, or in our knowledge of them) from a relation, the relation is constituted by those terms as such. To apply this to the present problem, A and B are known as qualities. But this means that A is related to A₁ by way of resemblance (or identity), to B by way of distinction. Apart from this relation, A and A₁ are particular contents apprehended or remembered. Compare them, note their resemblance, and they become qualities. As terms of a relation they are said to be qualities. But, it will

be replied, in relating we have also analysed them. A and A_1 , for instance, resemble one another in part, but also differ in part. We have abstracted from the difference and insisted only on the identity. But this identity rests on a common quality a . It is then really a which forms the basis of the relation, and not A and A_1 as such. Let this account pass as a true analysis, and consider what results. It follows that A and A_1 as such are no longer qualities; they are particular facts characterised by the quality a . The true quality is still the term entering into the relation, the relation is constituted still by the two terms taken together—the identity or perfect resemblance $a-a$. It results that, instead of a resemblance based on a quality a and resulting in a quality a , the resemblance is constituted by the qualities a which resemble one another. Now, if either the resemblance or the quality had to "come first," whether in the order of reality or of our knowledge, this would be a dilemma as bad as any in which Mr. Bradley has landed us. But since resemblance and quality are simply two aspects of the same result of the same process, we cannot admit that there is a genuine difficulty. Our process, in fact, amounts to this: we have two contents A and A_1 , which we perceive or think of together. We find in the total thus formed elements aa completely resembling one another. Apart from the resemblance, either a could only be this element in this content of our perception. In the relation of resemblance it becomes a quality. By one and the same act of comparison it becomes the quality and the term of a relation. It is not the one before it is the other, nor apart from being the other. Nor does it become a quality because some other elements of A and A_1 are related, but because it is itself related to its fellow. Nor can it even be objected here that my argument assumes a to exist and be known independently of the resemblance $a-a$. I have assumed this because I believe it to be a fact, and Mr. Bradley does not dispute its possibility—I have assumed, that is, that a can be presented or remembered, though not known as a , as a general content, apart from its relation to other things. But my argument does not rest on this assumption. If a and a only emerged into consciousness through the act of comparison, the result would be the same. In the whole AA_1 the element $a-a$, a resembling a , would be revealed by one act of analysis instead of by many. We need not even assume the knowledge of the whole AA_1 to precede that of the relative qualities. We may look on the whole as one analysed, complex content, given, if you please, at one stroke. It makes no manner of differ-

ence, once it is grasped, that the relation inseparable from the two qualities is that which the qualities themselves constitute.

7. But at this stage the difficulty may be revived in a slightly modified form. You take two terms and find them to be related. What is this relation? Something true of the two terms taken together, some characteristic, therefore, of the whole. You have, in short, analysed the whole, and found (among other things) that one element characterising it is this relation. Then you attribute this relation to the whole. But this means, again, that you have made, of the whole and the relation, two terms; and you have related them. You have then a new relation. And with this the process will begin again. The new relation is, in turn, a character of the whole, therefore attributed to it, and so on. Where, then, are we to stop in our analysis? We find one act involve another, and this a third, and we cannot find a beginning which shall involve nothing more simple behind it.

Let our whole be AB , and the relation found in it be $\alpha-\beta$. Then $\alpha-\beta$ is a character attributed to the whole; and this is as much as to say that AB is related to $\alpha-\beta$ as a whole to its element or characteristic. But what, precisely, are the terms of the relation? Simply AB on the one hand, and $\alpha-\beta$ on the other. No new terms, no new analysis, is required to make the relation. In short, the "relation" of $\alpha-\beta$ to AB is simply a way of attributing that relation to AB . We have not one operation resting on another, but the same content, the same operation expressed in different ways.

But, it will be said, this ignores a fundamental fact already admitted. Relation analyses its terms. Bring A and B into relation, and you analyse them into α and β . Similarly, bring $\alpha-\beta$ into relation with AB , and you must analyse them into $\alpha_1-\beta_1$, or what not. And this makes the infinite process. Analysis involves relation, and this relation a new analysis, and so *ad infinitum*.

This argument is based again on a confusion. In the case of AB , the whole AB is analysed and found qualified by $\alpha-\beta$, and in *this case* AB themselves are analysed. This happens in synthetic relationships, i.e. where two distinct terms form a whole and are so related, but are not attributes or characteristics one of the other. But take another case, where A and α are compared, and α characterises A . Here the correlation of α and A is the same thing as the analysis of A . But precisely on that account the relating of α to A does not *further* analyse either. The relation is a characteristic analysed out of the whole A . It is not an attribute analysed

out of α , for α has no existence except within it. In fact, two things have been confused,—relation implies analysis of a whole; it does not as such involve the analysis of its own terms. Instead, then, of something simpler than α related to it that must be known before α can be asserted, we have simply α itself in its relation to A . The distinction between analysing A into its quality α , and relating α to A , or attributing to A its relation to α , is one of words alone. So is it in the more complex case. A and B stand in the relation $\alpha-\beta$. This is an attribution of $(\alpha-\beta)$ to $A B$. These are two different statements for one and the same thing.

Of course the content A qualified by α may be further analysed—further characteristics either of A or of α may be found, and this may, without affecting the present argument, be carried on *ad infinitum*. That A and α can be analysed further in no way affects the fact that α does qualify A . Similarly, we may analyse the relation $A-\alpha$. We may compare it with $B-\beta$ and $C-\gamma$, and find that it is that kind of relation which we express by saying that the one term is an attribute of or element in the other. That is, we find now in the relation $A-\alpha$ an element μ identical for $A-\alpha$, $B-\beta$, $C-\gamma$. But this analysis is the work of the judgment which compares and names this relation, not of the analysis which first becomes aware of it. It is not therefore presupposed in the knowledge of α as characterising A . We may conclude that the objections to the conception of qualities and their relation as such have not been made out.

8. Another objection to the conception of quality, or, at least, of qualities as attributed to one thing, must be briefly noticed. The thing has many qualities; it is one, and yet many. How are these aspects to be reconciled? The question is generally raised in connection with the conception of thing or substance, and will in some form or other meet us again there. But, apart from the thing, the concrete whole of perception contains, as we have urged, many attributes, and the essentials of the puzzle may be dealt with at this stage. How, asks Mr. Bradley,¹ are we to conceive the thing, or, as we will say here, the whole, in relation to its qualities. The whole is one; but it is not any one of its attributes, nor is it the several attributes, for these are many; nor, finally, is it the attributes in relation to one another, for this is meaningless. We may object to this last position, and claim to have shown, if our above contentions are just, that attributes can be related to each other. Well, then, suppose the whole to be the mass of

¹ *Op. cit.* chap. II.

related attributes, will this satisfy us? If the attributes, it may be said, are related, are they not also separate, just as this line is related in space to that line, and therefore separated? If this is so, where is the unity of the whole? If, again, the attributes are not separate enough to be related, how can they be many? We shall have just the one whole, of which we can say nothing but that it exists. Once more we have a dilemma. Either the whole is one, and then has no qualities, or it is a mere expression for many related qualities, and these do not then form a single whole. To which we may reply, that the relation of the qualities is just that relation which forms a whole of them, while their distinction is that distinction which makes them qualities.

When we speak of a relation between two things the typical case of which we naturally think is that in which two contents already known in their separateness are considered together. Thus we have two similar triangles when each triangle has its own peculiarities, size, position, etc., observable separately and unaffected by the relation. Possibly the term "relation" ought to be restricted to such cases as these. But in current usage, and in the usage of this chapter, we have extended it to any sort of contents which, while in any way distinguishable, can also be considered together. We can therefore speak of the relation between the attributes of one whole. But what will the relation be, and what will it imply? It will be simply that of attribution; that which we express by saying that the attribute is an element in the whole, or qualifies the whole; or by saying that these two contents are distinguishable as attributes of or as qualifying one whole. No separateness of existence is implied, nor is there need of a unity outside the related attributes. *The kind of relation predicated is itself the unity.* The attributes are all inter-related precisely as forming one existence. You will say that this is no explanation, but merely repeats what has been said already; and I reply that it does not profess to be an explanation, but a simple statement of the facts, so far as words at all avail to express them, and the object of describing the relation afresh is simply to point out that one kind of relation is not another kind, and, in particular, that that kind of relation which we call attribution does not involve the sort of separateness which we associate rightly with relations of other sorts. The relation involved in attribution is precisely that of a distinctness which is not separateness.

We may then follow Hegel¹ in distinguishing three aspects

¹ *Phänomenologie des Geistes*, p. 85 (2nd ed.).

of the thing, as the whole (we shall see reason later to object to calling it a universal) which passively admits many qualities, as the unity excluding incompatible qualities, and as the many qualities themselves. But we shall say that these are mere aspects, and that contradiction arises from taking them in separation, the reality being a unity which is a whole of many qualities. When Hegel¹ develops these conceptions into contradictions, he seems to rest on illicit interpretations of them. Thus the object of perception, he begins, is a unity: but as property (*Eigenschaft*) it is also universal. But when I accordingly take the object as a community (*Gemeinschaft*), I am faced by the distinctness and exclusiveness of the property, and am constrained to take it as a unity again. But, once more, the object has many properties, and is therefore not a union, but a common medium for these. But these properties no longer related to an unity, nor to one another, are no longer properties, and we fall back from perception of properties into mere consciousness of the present content.

If it were meant that thought, in constructing for itself the nature of the thing, falls into these onesided abstractions, and is forced by the limitation of each into its contradiction, that may be true of one way of thinking. But it is only bad thinking which thinks like that. Each several aspect of the content of perception is here exaggerated, and it is only by exaggeration that it becomes contradictory. Take the argument at any step. The property perceived here and now does not cease to be a unity because it is universal, for its being a universal means not that it, *this* fact, exists elsewhere, but that it resembles other facts. The "universal" means properly the various contents resembling one another; and if we call one of them loosely an "universal," we mean that it enters into these resemblances. So, again, though the thing is one as distinct from other things, this does not make it a one outside of or excluding its many properties, since it is one only as the total of these properties. Nor, if we regard it as a "medium," does that mean that we cease to relate the properties to it or to one another, for it is just that kind of medium which involves them in the relation of a common attribution. Hence, while aware of the property as existing here and now, we can also compare and name it; and while aware of it as distinct, we can also relate it to its whole. At every stage the alleged contradiction depends on the surreptitious addition of something to, or abstraction of something

¹ *Loc. cit.* pp. 86-88.

from, the concept as actually required. If we take the conception from the facts as given, the contradiction ceases.¹

III. THE DIFFICULTY OF ANALYSIS

9. There is yet another line of attack which must be briefly met. The judgment analyses the given, and analysis, it is said, involves an unreal abstraction or separation. "As soon as we judge, we are forced to analyse, and forced to distinguish. We must separate some elements of the given from others. We sunder and divide what appears to us as a sensible whole. It is never more than an arbitrary selection which goes into the judgment."² That is to say, the general qualities which the qualitative or any other judgment asserts of reality do not exhaust the whole nature of the reality to which they are attributed. We qualify the present, in one of Mr. Bradley's instances, by saying, "The tree is green"; but this is a most meagre representation of the given as it is given. I call it a tree, but it is really a horse-chestnut of such an age, height, size, and shape. I say it is green, without noticing that it is green with the freshness of spring, and that the evening sunlight touches it with gold. All this is obvious, and it shows that my judgment is inadequate to the whole nature of reality. But when we are asked to go further, and say that, because incomplete, our statement is false, we shall require reasons of a different kind from any that have yet been alleged. We are told that we identify the whole with one of its parts. "If the real as it appears is $X = abcdefgh$, then our judgment is nothing but $X = a$, or $X = a - b$." But our judgment, if we know what we are about, is nothing of the kind. It is not $X = a$, but X contains a , or $X = a$, etc., an undetermined quantity. We are told that a or $a - b$ "was in the fact, and we have taken it out." On the contrary, we have realised that it was in. "It was of the fact and we have given it independence." On the other hand, we have recognised it to be an element in a whole. We have distinguished, but we have not separated; and the notion that we have so done can only rest on the assimilation of thought processes to physical

¹ In its simplest terms the *deus*, that the one cannot be many, is no *deus* at all, but a verbal puzzle. One thing can as easily have twenty attributes as one box hold twenty balls. At the outside the puzzle can rest only on the difficulty of predicating difference. If we can at all say of A that it is B , then we can say of what is one (in this sense) that it is many (in that).

² Bradley, *Principles of Logic*, bk. i, chap. II, sec. 62.

operations upon the real world. The quality, we are told,¹ "certainly *does* not exist by itself," and we must reply that no one supposed that it did; and then when we are asked, "How do you know that, when put by itself, it *could* be a quality of *this* reality?" we must protest against the form of the question. We know that it is a quality of this reality because we perceive it, but that we should at the same time "put it by itself" as though it were an independent whole, and treat it as a quality, would be a self-contradiction to which there is no inducement.

But this is not the whole charge. The presented content from which we start, and in which, if anywhere, we thought we had reality, is also weighed and found wanting. For present passes into past and future. Apart from them, it cannot be real; it is throughout conditioned by them, and to treat it as self-subsistent is unwarrantable. In our judgment, then, there must logically be a reference beyond the present, and thus we are landed in the infinite process. All time and space must be taken into account; and that, again, is an impossible requirement, seeing that there is no all of space or time.

That the present, while a whole relatively to its qualities, is an element in a wider reality, past and future, and that it conditions and is conditioned by that reality, is an obvious truism. It follows that whatever I say of the present, I say in a certain sense of reality as a whole. What does not follow is that I must know reality as a whole before I can know any one part of it. To know all about a thing involves knowledge of its conditions; but to apprehend a thing, or judge its qualities, so far from implying a knowledge of conditions, is itself the ground on which that knowledge is based. To say that you cannot know what a thing is until you know why it is, is like refusing to bathe until you can swim. It would be about as reasonable to deny that you have a toothache, because you do not know the physiological condition on which your toothache depends.

But it is said the fact depends on its conditions. Therefore, if we do not know what the conditions are, or that they are, how do we know that the fact exists? The obvious reply is that this is a *petitio principii*. If we can know the fact by apprehension, memory, and the other operations that form the judgment, then, without knowing *what* its conditions are, we can infer that they are or have been. The fact is: that is the starting-point for our knowledge; nor need we go beyond

¹ *Loc. cit.* § 67.

our Aristotle to learn thus much. But it is said¹ the present is such, and its conditions such, as to preclude the possibility of finding any ultimate real starting-point. The present is a link in a chain, and it hangs on to another link, and this to a third, and so on; and the question is, Is there anywhere an attachment to solid reality? The practical man hanging by such a chain will ask, says Mr. Bradley, not so much whether the links are really fastened together, as, first of all, whether the chain is itself attached to anything firm. I would suggest that the "practical man" will ask yet another question first, viz. "Am I falling?" If I am, then my chain is unsubstantial; if I am not, then it is both firm in itself and affixed to solid rock. To leave metaphor, the question is whether the present as such contradicts itself. It is not contended *here* that it does so *quâ* the present, but as leading us on into past or future. But do we here come to any self-contradiction? No, we only find reality stretching away in all directions beyond our vision. But, at no point do we get solid reality? On the contrary, we find it at every point. The present is the real, and contents given like the present are real, and what we primarily mean by real. Assume the contrary of this, and you are set at once to search for a reality which you will never find. But for such an assumption there can be no conceivable ground except in some conception of the real which can only be called arbitrary, as something self-subsistent, isolated, unrelated, and yet a datum on which other contents can be made to depend. If, then, the present were self-contradictory, and referred us to past and future to resolve its contradictions, and if past and future similarly dissolved into contradictions which could only be reconciled by a further reference, then, indeed, we might feel ourselves to be in a bad plight. From such a process there could be no escape, unless we could somewhere find a real of quite a different kind. But if the present, as such, seems to be real, though limited, and thus refers us to a past and future which seem to be real also, though once more not the whole of reality, our belief in the reality of the present will only be substantiated. We shall recognise, indeed, that we have not yet the whole in our possession; but we shall insist that what we have is, so far as it goes, real and true.

We have thus considered the main objections to the validity of the categorical judgment as such. Other objections there may be, but we have considered those which seemed most important, and have seen, we may hope, some reason for reject-

¹ See § 71.

ing them. And we shall accordingly continue to regard the judgment as a valid form of thought.

10. We have characterised the work of the judgment as the recognition of the order and resemblances of given facts, and we have now dealt with its validity so far as resemblance is concerned. It remains to add a word concerning the order of space and time built up *pari passu* with that of resemblance. We insisted in Chapter II. that space and time characterise our apprehended contents, and the ideas of the one space and one time in which all things are, will obviously be formed by construction of these data. But objections have been urged to the reality of space and time which we must briefly meet. Both of them, according to Mr. Bradley, involve contradictions which prove them to be unreal.

Take space first, and consider, to begin with, its constitution. Space is not a mere relation;¹ for it consists of parts, and the parts are spaces. If, then, space were a relation, it would be a relation of spaces, which would be a contradiction. But, again, space is only a relation, for it consists of parts, and these must be extended (or else the whole will not be extended). They cannot, therefore, be "solid," but must themselves consist of parts. Any space, then, is a relation of extendeds, which again are relations of extendeds, and so *ad infinitum*. "The terms are essential to the relation, and the terms do not exist," and space accordingly vanishes.

The assumption here is that space must be either a relation or a "solid." We may reply that space is neither a relation nor a "solid," if that means something indivisible, but a continuous character of the given. In any continuum you can take what divisions you please, and if you go on decreasing the size of the divisions you can take as many as you please. And you can carry this game on below the limits of the perceptible as far as you please. A continuous quantity can be regarded by thought, if thought so chooses, as an indefinitely great number of indefinitely small parts. This is what the infinite divisibility of space amounts to. It proves nothing as to the real character of space beyond, what we know already, that it is continuous. Since space is infinitely divisible in thought, we can clearly never come to an ultimate fragment of it which should be "solid" or indivisible. But what, we must ask, has this to do with the *reality* of space? Where does it begin to touch the question? Why, says Mr. Bradley, space is otherwise a relation without terms. For the total of space is related to its parts; and if the parts do not exist, where is the relation? But

¹ *Appearance and Reality*, bk. i. chap. iv.

whence comes the statement that the parts do not exist? It seems arbitrarily assumed that the whole must depend on the parts, and then it is easy enough to show that the parts are in the same case as the whole. In truth, parts and whole are alike real, containing and contained by each other; and neither is "more real" than the other, nor *presupposed* by the other. In fact, there seems to be no argument at all unless you assume what, indeed, appears to underlie the whole matter, that the real must be absolutely simple, indivisible, etc. But for such a view what is the evidence?¹

The argument from "infinite divisibility" then proves nothing. But there is another difficulty. If space, as we perceive it, consists of parts, it is never known as a complete whole. Any space we take is necessarily limited, and therefore a part of a wider whole. We are led now, not to infinite smallness, but to infinite extent. This is true enough, and the problems thereby raised are well known: nor can we here attempt any fresh solution of them. We merely deny that any contradiction, such as would throw doubt on the reality of space, is involved. Conceding that no final totality of space can be found, that any space we like to take, however large, must be regarded as bounded by further space, this does not prove the "portion" of space to be unreal. Space seen does not become unreal, because we infer an unseen space beyond it. Yes, says Mr. Bradley, it makes it merely one side of a relation to something beyond. It makes it related certainly, but does not reduce it to a mere relation. The perceived space A is related to the unperceived B. But it is not (α) the relation to B, but a term related; nor is it (β) merely the correlate of B, or intelligible merely as such. On the contrary, B is asserted merely because A is already given, and A is this space before me now containing these things, etc. Still less (γ) must we put off calling it real until we have found some term to relate it to, which shall be either a complete or perfectly simple whole not relating us to anything beyond. It is real simply because it is given. We are compelled to relate it by perception or by thought to further space. This further space is again real, either as given or as inferred from the given.

¹ The heads of the argument then seem to run: "What is real must be 'solid' (whatever solid may mean); what is solid cannot be extended; parts of space must be extended (otherwise they could not constitute space); therefore they do not exist but space is a relation in which they are the terms; therefore space is a relation of nothings." The latter part of this seems superfluous. All we want is that the real must be solid, and the solid cannot be extended. Hence, at once, space vanishes. Only where do the premises come from? And what (above all) do they mean?

We can carry on these relations *ad infinitum*; but nowhere do we come to the unreal. If our original datum could not be regarded as real, then we should indeed be at a loss to find anything more real. If in our relations we came on something which must be unreal, we should be perplexed to think how what seemed real should lead us to the impossible. But we come only to that which is identical in character with our starting-point, and therefore equally real. In short, the objection rests on the belief that space as given is not real, and this again upon the old conception that what is real cannot be related to anything beyond itself. But for this again we await the evidence, and we can only at present say this—that it cannot be proved by reasoning which sets out with assuming it.

The case of time is, as Mr. Bradley remarks, precisely parallel; and as our treatment of criticisms upon the conception would be a mere repetition, *mutatis mutandis*, of that already applied, we need not give them in detail. We will only observe that the whole conception of time as a relation of units appears to be beside the mark. As before, time is neither merely a relation nor a collection of timeless units, but a continuum which you can divide as much as you please. As to the "now," we have already seen that it is either (α) a mere abstraction, like a point in space, where relations to the rest of the continuum alone are in question, and internal parts and magnitudes are disregarded, or (β) it is the section of time filling consciousness, and it then has duration. This might serve for us as a unit; but such a usage would be quite arbitrary. Any difficulty in conceiving duration as real rests on precisely the same assumption as before—viz. that the real must be ultimately simple and undecomposable for thought.

In short, the difficulties attaching to space and time resolve themselves, as Mr. Bradley rightly remarks, into those of qualities and their relations. Can a real fact have qualities or elements and be related to other real facts? Admit, with our previous conclusion, that this can be, and—though there still remain special *difficulties*, to which we shall recur, regarding the infinity of space and time—there is nothing to be said against their real existence as characters of the given.

PART II

INFERENCE

CHAPTER I

IMAGINATION AND ITS FACTORS

1. HITHERTO we have had to deal only with those acts of the mind which aim at apprehending and retaining what is given to it. For both the movements of analytic attention and the construction which sums up a number of facts given at different times must be regarded as aiming, not at the assertion of anything further, but merely at the formation of a more vivid and complete knowledge of what is and has been presented. We have indeed been obliged to recognise mental states, like ideas and judgments, which normally, perhaps always, involve something further. But we have purposely treated them in isolation from this disturbing factor, and have described them as what they would be without it rather than as they actually are.

When we come to imagination, however, we find ourselves unable to pursue this policy any longer. The whole gist of imagination lies in this, that in imagining the mind asserts, suggests or presents to itself something the like of which it has never seen or heard. A centaur, a chimera, a brain-wave, the ether, a perfectly contented man, are classed as imaginary contents precisely because we cannot become acquainted with them by the ordinary senses. In these and all such cases the mind forms for itself the idea of something *new*, something which it has not apprehended. And if we take this as the differentia of imagination, we shall have to consider under the same head, not only that which we cannot touch or see, but that which we *have not* touched or seen. Thus, the morning's work which lies before me, my lunch, and my afternoon walk, are all in this sense at this moment matters of my imagination, no less than the giants and genies that amused my childhood; and I imagine Julius Caesar and Shakespeare just as I picture Ali Baba and the Sleeping Beauty. Clearly there is a good deal of difference between the two cases. I believe in to-day's dinner and Julius Caesar, while I have lost all faith in the hundred years' sleep, and have grave doubts about the Robbers'

Clave. This difference as to belief will occupy our consideration only too much in the chapters that follow, but meanwhile we must insist on the generic resemblance. My ideas of Blunderbore, Mr. Pitt, and this evening's dinner, differing in all other respects, are alike in this, that their contents are not and have never been matter of apprehension to me. Calling all such contents, imagined contents, we have to ask what is their general character as compared with the facts of apprehension, and what further condition do they imply? And by this last question I intend at present to ask only what conditions the mere formation of such ideas necessitates, postponing to subsequent chapters the question of the differentiating conditions which make some of them "mere fancy" while others are articles of belief.

2. Imagination is sometimes divided into two classes, the productive and reproductive. What I have said above will be enough to show that as I use the word it can only be applied to those cases in which the mind "produces" something new. Mere reproduction is as a logical act simply equivalent to memory. The image which I have now of the moorland drive I had just a year ago, is, no doubt, not precisely the same thing as my remembrance of that drive. But, then, so far as it is an image and not a remembrance, it ceases to be an assertion, and loses its value for logic. In logic we want to consider what assertions are made, what they depend on, and how we can tell that they are true. We do not wish to enter into the details of our mental states,—even when they involve assertion,—as they are in the concrete. This is the province of psychology, which has to consider states of mind as such, and the conditions on which in all their fulness of detail they depend. And thus it is a matter of great interest to the psychologist, that with a good memory you may be a poor "visualiser," or inferior in any other method of "reproducing" ideas. To logic, on the other hand, these various images, which more or less vividly and definitely form a part of the act of mind which asserts the past, are unessential and cumbersome. They have not the character of assertion unless they are memory-judgments, and to the memory-judgment they add nothing.

The productive imagination has been explained pretty often, from Locke onwards, as consisting of a combination of simple ideas. Put together the idea of a man and a horse, and you get a centaur. Combine the wisdom of Socrates with the purity of St. Francis, and you get a perfect man. The idea of "man" and "horse" are given, the combination is

not given. Therefore imagination is a combination (not given) of contents which are given.

I believe this account to contain the essentials of the matter, but it requires some further nicety of explanation. How, it may be asked, does the combination get itself effected, and why does it take certain forms? Take the centaur case; put a man and a horse together, and why does a centaur follow? Why not a man on horseback, or a man leading a horse? What, again, becomes of the horse's head and the man's legs? Surely we have division as well as combination. Again, is there no limit to the combination of given ideas? How is it that I cannot "combine" the idea of straight and crooked, and so imagine a straight curve? Why is it nonsense to speak of a tall sound or an intelligent square?

Keeping to the notion of imagination as a construction of given elements, we can hope to answer these questions by considering what construction of this kind involves and what elements it uses. Starting from the apprehension of the given there are two possible processes, with both of which we have already had some dealings, and both of which may be said roughly to be always involved in imagination. These processes are those of division, splitting up, analysis, and combination, putting together, synthesis. Imagination certainly involves the second, and may be taken as practically necessitating the

first.

3. To begin with the analytic movement. We began by describing imagination as a combination of ideas, not of apprehended contents; and we found that even ideas have to be mutilated sometimes, as when the horse in becoming a centaur loses his head. This would be remedied very simply by Locke, who would tell us that the units of imagination are simple ideas.¹ Very likely, but how do we get at simple ideas? We have already insisted that the simplest ideas are no more directly given us as such than the most complex ideas. Assuming that they exist and are the materials of imagination, we must conclude that they are the results of the splitting up process, in fact, are abstractions. We have already dealt with abstraction and its conditions. An idea is usually, if not always, in some degree an abstraction—that is, it is a part only of a given content and not the whole. It is not formed, as we saw, simply by dropping out the rest, but, as a rule, by comparing two facts and singling out the common point in them. Nevertheless this common point is far from exhausting all that is given in the cases

¹ See, e.g., *Essay*, bk. ii. chap. xii. §§ 1, 2, and 8.

compared. A colour must really be, i.e. must be apprehended as some definite colour. Even "blue" or "pale yellow" are still abstractions, for what is seen must be some tint of blue or yellow with a definite degree of luminosity, etc. The given, then, as compared with the idea, is rich and composite. Simplicity, if it exists, is an artificial product.

What now are the limits of abstraction, and does it lead us to certain simple ideas which we may take as final units of our mental constructions? We can at least suggest answers to these questions. An idea of the kind in question is the product of analysis. It is when definite the point of identity p discovered in two otherwise different contents A and B . But we have already seen that analysis is a progressive movement. The p which was found identical in A and B is compared with a q found in C and D , and on analysis p and q are found to be identical in π which they differ in ρ .

Will π in its turn reveal a similar compositeness? How can we say until we have made every possible comparison and exhausted the last efforts of analysis? Meanwhile π , if not "absolutely" simple, is at least as simple an idea as we can get. We cannot construct it out of anything more elementary. I conclude, then, that analysis is always resolving ideas into simpler elements; that, for the time being, its latest products are for us simple ideas, undecomposed and undecomposable, unless some new turns of comparison or some new sharpening of our attention should intervene; but that it would be rash to infer of any one of these ideas in this condition, that because undecomposable to us, it is so ultimately and in its own nature.

In this way, then, the limit to abstraction is one that may almost be called personal—it is certainly subjective. It depends on the stage at which comparison and analysis have arrived. But while this limit is always shifting, there is an inner limitation of a more determinate character. Undecomposable ideas need not be entirely simple. M and N may be distinguishable elements in an idea, and yet may be incapable of being entirely separated. Brightness is a distinguishable quality of colour, length is different from breadth; but I cannot, in ordinary phrase, conceive a "bright" which is not a bright colour, nor can I really imagine length without breadth. To assert the one without the other is not so much false as unmeaning, and the inconceivable, in the true sense of that word, which distinguishes it from the incredible, is simply the meaningless.

4. To determine the limits of conceivability in this direction, let us ask, when is it that M and N are inconceivable apart?

It is when neither they nor the like of them have ever been given apart. To put it more accurately. If M has been given with N (whether once or oftener), and never apart from N, and if, further, M cannot be analysed into a particular case of a more general in (given apart from N), then to assert M is to assert the whole M N. Examining and comparing certain colours, I notice a characteristic, brightness, common to some though not in all. Red, blue, green, and all their various tints may be bright or dull, but what is bright is always colour. Hence brightness is inseparable from colour. To assert it is to assert colour. To assert of a content that it is bright and deny that it is coloured, is meaningless. On the other hand, since brightness is given indiscriminately with all shades of colour, to assert it is not to assert any one shade, but merely colour.

In taking this illustration, I am supposing analysis to have stopped at a certain point which it may perhaps have passed. A piano-tuner speaks of the tone of his instrument as "bright"; we talk of a bright boy or a bright mood. And probably this is not a mere caprice of language, but marks a subtle analogy detected by perception in the contents named. The shade of feeling, the *Gefühlston*, of a bright colour, bears a resemblance to that of a lively mood; and in the exercise of a lively intelligence there is again the same touch.¹ Now, if by "bright" is meant this rather impalpable shade of feeling, if analysis can discriminate this element in all these various contents of apprehension which have nothing to do with colour, then bright becomes established as a distinct content, and no longer carries with it the assertion of colour. But as long as any content M is given with N only, and never with anything else, we cannot assert it separately from N,—an M that is not an element in a whole M N means nothing for us.

How, then, do we come to speak of M at all? If length and breadth mean nothing apart from one another, how is it that we distinguish the terms? The answer is, that an undecomposable idea is not necessarily simple. It may contain parts, elements, or aspects recognisable by distinct movements of attention. Attention, that is, may be concentrated now on the one element, now on the other, and hence the attention to the whole is aware of the elements that constitute it. But in attending to M, I cannot altogether escape N. In considering the length of an object, its breadth must occupy consciousness in some degree, that is, must qualify my apprehension of the other element. Now, if M is ever given me with some different fact as P, in this apprehension there is no trace of N,

¹ Cf. Wundt, *Phys. Psych.* c. 10, § 3.

while in the original datum there was none of P. This enables me to draw the boundary line. M is now that which is common to M N and M P, and it is apprehended free, so to say, from any trace of N. Hence it can form the content of a separate idea, conformably to our general theory of the idea as a reference to something that has been already apprehended. All that our theory postulates is that the analytic movements of attention within the given should, on occasions, outstrip the power of definite comparison, or, in other words, should be effected in the absence of comparisons to determine them. If it is objected that words like bright, long, loud, which never express the whole of a content, are yet general names, and therefore, in accordance with Chapter VII., must represent general ideas, it may be fairly answered that the use of these words in isolation is elliptical, and that they really mean bright colour, long distance, loud sound, combinations of words each of which does express a definite idea. Undoubtedly the elements in the content expressed by the adjectives do serve to differentiate one idea or one given content from another, but that is not as much as to say that they form the content of separate ideas by themselves.

Again, it may be urged that we do think of these abstractions apart from the remainder of their content. Euclid, for example, clearly conceived length without breadth. We talk of the conservation of energy without thinking either of masses or of molecules, or of the spirit of the British Constitution without thinking of British men and women. Yet what is energy apart from matter, or a constitution apart from human minds? It would perhaps be a fair retort that those who do use such terms without thinking of the concrete facts in which alone their meaning can be realised, are already using words as symbols merely, and are in danger of saying that which is "full of sound and fury signifying nothing." Nothing is easier than to talk without meaning anything, and a logician is not bound to account for all the sounds that issue from all manner of mouths. We need not suppose that everyone who makes use of an idea is bound to realise its whole character, and all that it implies. We have seen how difficult it is to determine the content of judgment, when we think not of the symbols used, but of the mental act which calls them into being. Similarly, to ask how much a man realises of an idea that frames itself in his mind, rests there a moment and is gone—this is one of the most endless of problems, and would require as many solutions as there are individuals who think. All we say is, that in the cases in question the assertion of M is *logically* the assertion of the whole M N,—a position which

admits of this simple test, Can you, while asserting M, deny N of it? Can you, for instance, in asserting length, deny that it has breadth? If not, long-broad together form the undecomposable idea of surface, in which you may concentrate attention as much as you please on either element, but yet cannot so wholly isolate it as to deny the other of it. This inseparable companionship may be forgotten while the idea is not clearly present, but becomes evident whenever we "fully realise" what the idea means, i.e. present it to ourselves in all its definiteness.¹

5. A special case arises (as already noted) where M, while itself never given apart from N, is simply a particular case of a more general content m. In this case m may be given with all sorts of other concomitants, and is thus the content of a separate idea, of which M figures as a particular case. The partial identity operates as a basis of comparison as effectively as a complete identity. It is recorded of Bibulus the butler that

"No mortal might
Had ~~seen~~ that night
Seen him with shirt unstarched";

but there would have been no difficulty in conceiving him in a suit of white flannel, owing to his partial identity with other men. And hence Mill seems to have given the right answer to the objection that it is easy to conceive black swans which you have never seen, when he pointed out that animals generally vary indefinitely in colour, and it is through their similarity to the rest of the animal kingdom that we can easily detach the idea of swans in other respects from the idea of whiteness. It would be more logical to push the argument a step further, and point out that the content "swan" is never given. It is a complex content made up of a multitude of apprehended facts. What is actually given as white is merely the swan's shape; and even if we have never seen anything of that figure differently coloured, we are accustomed to the combination of all kinds of figure with all kinds of colour, and as a case of figure the shape of a swan is a distinct and separate content from its whiteness.

In truth, the objection only had force against the peculiar psychological argument on which Mill rested his view. If the connection of length and breadth, or of the three sides of a

¹ In Pt. I. Chap. VII. we admitted that ideas might be formed by analysis without comparison. The point here is that their content cannot be isolated from its context without that aid.

triangle with its three angles, were due to a multitude of experiences which have built up an association between ideas originally distinct, it is hard to see why any frequent experience should not operate with proportionate strength in the same direction, whereas it is palpable that very strong empirical generalisations do not begin to be so established that their opposite is inconceivable. You may be sceptical about Methusaleh, but you have no difficulty in imagining him. If ideas were given as distinct, there would be no way of accounting for the strength of their cohesion, however often their conjunctions are observed. But in our view it matters not a jot how often the connection MN has been observed—once is quite sufficient. The point is that we start, not with M and N out of which we build up MN , but with the complex MN , which we differentiate if we can into M and N , its elements: we can do this if comparison gives us any instance of M with O , P , or Q ; if not, the assertion of M will to our dying day carry N along with it.¹ One further remark only need be made. According to the nature of the elements there is a distinction in the character of the implication. Brightness involves colour—a definite general attribute. Similarly, colour involves *some* tint; as nominalism triumphantly insists it is never given in the abstract, and therefore means nothing in the abstract. But—to waive the question whether colour is not simply an expression for any tint, whatever it may be—the assertion of colour does not carry that of any particular tint, but only the indefinite—some tint. We conclude, then, that it is only the common element N in the facts given with M which is implied by the assertion of M . Of the varying particulars O P Q , one of which must be present, but only one, all we can say is that some one of them is implied without the specification of any in preference to the rest.

Abstraction, then, is limited by comparison. If the activity of attention goes beyond this limit, it serves only to reveal aspects of ideas which cannot be separate nor be made independent, and the important corollary follows for the imagination, that if you take the part you must take the whole.

So far of the limits of abstraction. Meanwhile, all we have said simply corroborates the view that it does not go beyond the given. In analysing we are simply concentrating attention on a part of what is given; and in framing an idea we are simply reasserting such a part of reality without determining the character of its context.

¹ *I.e.* analysis so far outstrips comparison as to distinguish elements without its aid, but not so far as to be able to take them out of relation to one another.

6. From what has been said the conditions under which an abstraction is valid will readily appear. The abstract content is drawn from the given, from the fuller, more concrete reality with which we are in contact in apprehension. It is a content referred to reality which is not exhaustive of the whole nature of any real fact, and it is accordingly, as a description of reality, always inadequate. Two results follow. On the one hand, to assure ourselves that an abstraction has any validity we should be able to exemplify it, to instance a concrete reality in which it can be found.¹ Its validity consists simply in the fact that some reality exists in correspondence with it, and needs no further test. On the other hand, the abuse of an abstraction consists precisely in taking it for the whole reality from which it is abstracted, or (more broadly) for any part of that whole which it does not really cover. The victim of abstraction is he who takes one side of the truth for the whole truth, and from such one-sided use or rather abuse of the abstract comes the inevitable "dialectic" of thought. Outraged reality reasserts itself against the usurping abstraction; reaction ensues, the pendulum swings to the other side, and the complementary one-sidedness takes the place of the first. The natural right of the people is set against the divine right of the king; the right to live against the rights of property and so forth. But the second abstraction runs the course and shares the fate of the first. Pushed to an extreme, claiming to be "absolute," i.e. to be exhaustive of the whole reality that need be considered, it goes "beyond its measures," and calls the Krinnyes upon it. And now retribution may come in the shape of simple reaction to the first stage, as Waterloo and the Holy Alliance; or thought may brace itself to a harder task and try to grasp the whole from which both abstractions were first taken as a whole, i.e. as including both the elements hitherto held apart. Then at last contradiction ceases. The two sides, which as claiming to be the whole were irreconcilable, now live at peace in a higher synthesis, and from this point of view the constant effort of thought is to make synthesis of the abstractions which it has itself engendered, to reconstruct in its conceptions the reality which it took to pieces by its own analysis.

The dialectical movement, then,—the perpetual oscillation from contradiction to contradiction, resulting at length, when it seems good to the Gods, in a higher synthesis,—is a natural and necessary process when thought has once fallen into a one-sided use of an abstraction. But this process, we must note, is set on

¹ Instances in which the ideal content is not or cannot be realized are dealt with lower down.

foot, not by abstraction as such, but by the onesided use of abstraction, that is, by taking the abstraction for more than it really is. The abstraction itself is not necessarily invalid or incorrect. What is necessarily invalid and incorrect is the thought which takes the abstraction as an exhaustive description of the reality in which it is only a feature or an element. It is true to say that man is a featherless biped, or "ten stone, more or less, of warmish albuminoid substance," but it is highly misleading to assert this as if it were an adequate description of a human being. And mistakes of this kind constitute perhaps the root fallacy of materialistic or quasi-materialistic views. The manifold explanations which are "much too simple to be true," the abstract science like the old political economy which proposes to deduce concrete results from a few self-evident first principles, and the crudities of cynicism which trace all the subtleties of the soul to a few coarse and palpable motives,—all are shipwrecked on the same rock.¹ They take the part for the whole, the outline for the picture, the dead abstraction for the living thing.

But we only commit this very fault of onesidedness over again if we argue from the abuse of abstraction to its inherent falsity. Man is not merely animal, but he is animal *inter alia*. The abstract may be a genuine characteristic of reality as far as it goes, though we shall be wrong if we take it for the whole character. Similarly, whatever we can abstract must be a distinguishable element in some concrete being; but once more we overdo the distinction if we deepen it into a separation, and suppose the abstract to exist "by itself." Hence the dialectical process belongs to the pathology of thought. It is not its normal, healthy life-process, but the painful treatment by which it throws off morbid excrescences and regains its natural condition. What is normal and necessary is the formation of abstractions along with the knowledge that only the whole can be the reality, and that the abstraction is not the whole. And this prepares the way for the true intellectual reconstruction of the whole, which does not necessarily reverse or modify, but simply supplements abstraction by resetting it in its context. And since the "context" by itself could not be the whole, we must regard it also as an abstraction, and the complementary abstraction to that with which we start. Thus the true reconstruction is the combination of complementary abstractions, which gives us in the end the true whole, understood

¹ Cf. Comte's admirable and suggestive account of materialism (*Outline of Positive Philosophy*, Bridges' translation, pp. 36, 37).

as a whole of distinguished and specifiable elements, i.e. as a structure.

Thus it was a step forward in thought to distinguish extension and colour as elements in all visible contents. It was a one-sided error to suggest that the immediate object of vision is colour or rows of coloured points from which, *per impossibile*, extension was conceived as removed. It was a converse and, in part, counterbalancing error to treat void infinite space as a possible and actual object of intuition. A synthesis ensues when it is seen that the two characteristics of the visible qualify one another, and are alike elements of any assignable visible object; and it is clear that philosophy would have saved itself much trouble if it had proceeded by this method of supplementation from the first.

Again, it is an advance in thought when we distinguish the separate forces acting on a body, say, e.g., inertia and friction on a stopping railway train. It would be the mistake of abstraction to begin with inertia as if that were the sole force to be considered, and then pass over to friction and proceed in the same way. But we may here treat the forces one by one without forgetting their actual union in the concrete whole, and then we get a simple and self-consistent exposition which "reconstructs" the reality for us, i.e. enables us to understand the total result as something composed of elementary factors, by the simple and straightforward process of taking all the factors and ignoring none.

7. It will now be clear that, starting from any abstraction we like, and bringing it into contact with a wider reality, we shall find a complementary abstraction arising—the one side of the shield implies the other, and the implication becomes apparent as soon as we would view the shield as a whole. So far we have supplementation, the healthy and necessary process of understanding reality as a complex whole of distinguishable elements. But if our original abstraction were taken for more than it was worth, the "other side" will necessarily modify and correct it. This is the dialectical method in which we painfully attain truth by swinging from error to error, and from error to error back again. A special case of the overstrained abstraction is that which takes a feature or character never given apart from some other, but distinguishable and nameable on its own account, and conceives it in isolation from that other. Length without breadth, quality as such and opposed to any definite quality, pure being, tint as opposed to colour, are abstractions of this kind; their peculiarity being that they are "overstrained," not by being taken for real

wholes of apprehension, but merely by being conceived in separation from their complements, i.e. in isolation. The attempt to deal with these abstractions as such, i.e. in their "pure" character, lands us at once in the dialectical method. We can, of course, treat of things qualified *quâ* qualified, i.e. in respect of their quality, and find out facts that hold universally of that which possesses quality. And in this sense we deal with quality as such. But when we try to isolate quality in thought from that which it qualifies, or from any kind of definiteness, we seem to be separating that which is only distinguishable, and we then have to undo our work by bringing in again the omitted element, and so far modifying the "pure" concept with which we started,—a process, it may be added, which becomes tedious when repeated over and over again through three volumes. In so far, then, as the dialectical method is applied to conceptions of this kind it has a justification and a value of its own. Only it applies, not to the conceptions of quality or quantity, substance or cause as such, but always to a particular way of conceiving them, and that a wrong way.

If the correction of abstraction by the more concrete thought is a mere incident of subjective thinking, the alleged passage of one concept into another can hardly be ranked as more than a meaningless collocation of words. One of two things; either the mind, influenced by the latent notion of a fuller reality, passes from concept to concept, or there is no transition at all. The content of a concept when there is a concept, has a certain character. That character treated as an individual fact in time, or as belonging to such a fact, may, of course, change, but to say that this character, properly conceived, is another, would be a simple, flat self-contradiction. It results, as expositors of Hegel have tended to admit,¹ that the process must be thrown into the mind of the dialectician. It is not, after all, quality that turns into quantity, or being that passes into essence, but we, who under Hegel's guidance, are led on from conceiving quality to conceiving quantity, and thence to the notion of measure as the "truth" of both.

But, granting this confusion cleared up, do abstract conceptions as such turn out inconsistent with themselves or with

¹ See, e.g., Mr. M'Taggart in *Mind*, N. S. Nos. 1 and 2. It seems to me that Mr. M'Taggart hardly realises how fatal his admissions are to Hegel's claims to have exhibited the essential process, the very life of thought. Once admit that the dialectic is of subjective importance, — represents the effort of the individual towards truth, and is contingent on his limitations, — and its claim to have set forth, for example, the "nature of God as He is in Himself before the creation of the world or a single human soul," appears a little overstrained.

one another? Obviously there is incompatibility when two different conceptions are each claiming to be the whole truth. The claim of the part to be the whole must certainly be contradicted as soon as the truth is known. But even here it is not the content of the concept abstracted from reality which is contradicted, but only its extravagant claim,—a claim which is not based on abstraction, but upon confusion. In other words, the abstract is not inconsistent with itself as such, but the thought which takes it, say, in isolation, is inconsistent with its true character.

The notion of the inconsistency of the abstraction appears to flow mainly from a confusion with regard to negation. We have seen that the negative judgment ordinarily involves two "moments," or can be treated in two ways. On the one hand, it expresses some positive relation of difference or distinction between two contents—as in the judgment that the legal and the moral do not always coincide. On the other hand, it excludes or rejects a suggested content. "To pay starvation wages is not moral." Now each abstraction that we take up, *ex m. termini*, is not its complement, i.e. it is distinct from its complement, and is in this sense opposed to it, the negation of it. All these expressions can be readily forced to mean that the first abstraction is the denial of the other, so that if you have the one you must, *eo ipso*, reject the other. You skip from distinction to exclusion or rejection, and your work is done, and all the time you are under the shelter of the negative judgment. For in denying do we not distinguish; and therefore in distinguishing do we not deny; and if we deny, we exclude or reject from reality altogether. The fallacy is obvious enough. In distinguishing we certainly deny the confusion of terms which would override that distinction, but we do not necessarily deny the reality of either term distinguished.

So we come to this, that A being distinct from B is the negation of B. But we need not remind ourselves that A, being an abstraction, postulates precisely the complementary abstraction from which it is distinguished. Hence A postulates what it negates and denies what it implies, and the dialectical method is in full swing. Well may we talk of the "overwhelming might of the negative." With such a logical implement in one's hand one might start anywhere and prove anything. It is a strong statement, but scarcely an exaggeration, to say that this equivocation is the commonest fallacy in the Hegelian dialectic.¹

¹ It would be a hopeless task to illustrate adequately. I will take a single instance—the proof of the contradiction inherent in the conception of somewhat

I conclude that abstraction is much as other things are. It can be used and it can be abused. To the use of it certain fallacies with a character and interest of their own are incidental. These consist mainly in taking the abstraction for more than it is worth, in forgetting that it can be realised only as a feature of a concrete whole, or in treating it as separable from that from which it can only be distinguished. Such an usage of abstraction involves us in what has been called dialectic, the correction of a one-sided error by another which is equally one-sided. This process, taken strictly, seems best explained as contradicting only so much of the conception as is involved in treating it "for more than it is worth"; but in no case can it be taken as a necessary process of thought. The true conceptual reconstruction of reality proceeds by supplementing partial views by one another, with the result that the whole is finally seen as a complex structure of elements. The elements recognised are distinct without being mutually exclusive or self-contradictory.

(*Klaus*). Somewhat, Hegel has argued, implies another; in fact, it is itself another, since it is indifferent which of the pair we call somewhat and which the other (*op. cit. Werke*, vol. iii. p. 116). Let this pass, and note what follows later. Somewhat, as possessing a definite character, must have a limit marking it off against another (*hat eine Grenze zunächst als gegen Anderes*, p. 127). Now what is a limit? Why, a limit is just what marks off this from that; it is the negation then, the exclusion, the rejection of the other (*sie ist das Nicht-seyn des Anderen*). But then "the other is itself a somewhat in general," and so the limit belongs to it too, and, in fact, only through it is limit of the first somewhat. It follows that it is the negation of the first somewhat as well. Hence somewhat implies a limit, and limit is the negation of somewhat.

Other fallacies might doubtless be detected in this argument, but the centre of the argument is simply that the limit being that which distinguishes A from B, is the negation of B. This admitted, it follows that it is the negation of A. But why anyone should admit it, except on the principle that you can get anything by asking if you ask with sufficient confidence, seems totally unintelligible.

CHAPTER II

IMAGINATION AS CONSTRUCTIVE

1. IMAGINATION is a form of construction or combination. Its materials are the elements drawn from reality by the methods, and under the conditions, described. These abstract or ideal contents it puts together and makes of them new wholes of thought, the like of which have not been seen or heard. Now we have already seen something of the constructive activity of the mind in its less pretending forms. I place Millais' two portraits of Mr. Gladstone side by side in the mind and compare them, though I could not actually see them at one and the same moment. So far, however, I imagine nothing. I reproduce only; for though I frame the idea of a whole which has never been given as a whole, yet both the elements of the wholes have been given, and nothing is added to them. If, now, it is suggested to me that these portraits represent different sides of Mr. Gladstone's character, and that the real man is a fusion of the two, I try to make a different kind of construction, in which the fire of the one portrait would be blended with the repose of the other—in short, I attempt a fusion of the two instead of a mechanical addition of one to the other. What precisely happens would be difficult to follow in such a case, even supposing the fusion to be successfully performed. Take a different case. I want to give you a rough idea of an ornithorhynchus, and describe it as having the body and legs of a quadruped and the bill of a bird. Imagine a four-legged animal of any familiar type and append to its head a bird's bill, and you get a very rough idea of the creature. Now, it is not enough to say that this is a union of two ideas, for there is a union of them in merely asserting them at one and the same moment, or in any relation to each other. In this case there is an actual application of one idea to the other; they are joined, as the physical bill is joined to the physical head of the ornithorhynchus, and the union involves precisely the same thing, a common point in which

they touch. In very many cases of application this common point is the actual possession of spatial surfaces, such as can be brought into contact in the manner called for by the act of imagination. Whenever that is done, whenever in an ideal content a certain point is singled out as falling under some other idea, then the two ideas are applied to one another and combined in the sense requisite for imagination. A new whole is formed, which is not a mere summing up of the elements, but consists of the elements placed in a new relation¹ to one another by the identification of some one point in each with some one point in the other.

Without this point of identity, two ideas asserted together remain side by side unaltered by the juxtaposition. The idea of wisdom may be "called up" together with that of purity, but if there is no medium of communication between them the resulting idea will be simply one of wisdom and purity, each remaining a separate quality as it was before. The communication may, no doubt, be indirect. There may be in A no point held in common with B; but if we can find some C which has p in common with A, and q in common with B, then it is possible to form an idea of the whole A C B which will not be a mere reassertion of A C and B in a single act of consciousness, but will involve some new relation of these elements, or even a modification of the contents themselves.² Objects in space, again, will give us the simplest illustration. Suppose that we are inventing a new machine, or following the description of one we have never seen. Then, if we mentally apply one rod A B to the end of another B C (as the connecting-rod is applied to the end of the piston-rod), we get direct application—the point of junction being common to the two contents. Again, the crank D A is applied to the connecting-rod A B in

¹ I.e. a new relation of some definite kind. We have seen (Pt. I. Chap. XII.) that the mere putting together of two contents in thought may be said to constitute a kind of relation between them; and if they have never been thought of together before this putting together would constitute a new relation. The relations of which we speak at present form some definite characteristic of the whole, and are not a mere expression for the whole itself. They then involve some modification of the whole as formed by mere "summing up." And if it is further objected that the merest "combination" is in some degree also a transformation of conceptions, we may surrender the verbal point here and put it that our object is to distinguish the degree or kind of transformation belonging to combination as such from the special and definite kind described in the text.

² I.e. in this sense that content A (a quality) is imagined as qualifying B, as when I try to picture a view which I have only seen under cloudy skies as it would be bathed in sunlight. This must generally involve some abstraction from the given, as well as application—the new quality must replace an old one.

a similar manner, and so we have the whole D A B C forming a connected system in which D A is connected with B C through A B, which has its extreme points common to both. Or the intervening link may be a mere relation. Supposing in the same machine I want to conceive a parallel motion between the rods A B and C D, then I have to consider them in their abstract character as lines, i.e. I must apply to them the general conception of two straight lines in space. Here then we have A B and C D, two iron rods, and $p-q$ the conception of parallel straight lines (involving two lines and a certain given relation). The surfaces of A B and C D are straight lines, i.e. have the perceived elements p and q . Hence the relation $p-q$ is applicable to them, and by means of it I can place the rods correctly in my mental picture. A great deal of our imagination being of the visual order, space and colour play an important part in it. The idea of a dragon or chimera involves, no doubt, physiological notions of an absurd kind, but those who imagine such things do not go into all these implications. To the reader of legends and fairy stories the dragon, the ogre, and the fairy are primarily visual images with certain traditional modes of behaviour; and the visual images are mainly, I believe, formed in the simple way above described, of superimposing a part of one known figure on a part of another, involving a simultaneous abstraction from the constituent figures as given, and selection of two spatial points or lines in each to be identified. When we come to modes of behaviour, time relations play the part hitherto assigned to relations in space, and they range over even wider limits. If two things are to be connected through a space relation, each must at least have a spatial character, and not all things are spatial. But everything can be viewed as temporal, and there is no limit, apparently, to the imagination of changes in the succession of things. You can hardly imagine a monster which should be at once a crab, a devil-fish, and a boa constrictor; but if you read the *Arabian Nights* you can soon fancy a magician changing himself in the space of one minute through all three forms. At the same time, it must be recognised that here we approach the lower limit of imagination, where there is the minimum of modification in the whole imagined, as compared with the whole formed by "summing up." It is but another step, and instead of a single monster constantly changing his shape, we get a mere succession of ugly forms.

In more complex cases it is not always easy to determine what the point of identity is on which imagination turns. In the perfect combination of intelligence and goodness I suppose

we find the 'meeting point' in the psychic character involved in both, though whether this is to be regarded as constituting a direct or indirect relationship is a question which would open up a long and well-worn controversy. I cannot pretend, therefore, that the view at present before us rests on an exhaustive enumeration of all classes of imagined contents. It can only claim to be a hypothetical explanation of the nature and (as we shall presently see) the limits of imagination, resting on an examination of the simpler instances, and on the following general consideration. To imagine being to combine ideas, to infer being to assert one thing of another, both activities, which so far are not differentiated, involve the assertion of some relation between the ideas in question. If in the idea $A (=mno)$ you can find a point o such that you can regard it as also an element in the idea $B (=opq)$, then you have a direct relation between A and B constituted by this possession of an identical point, and your imagined whole is the total $mno + opq = AB$, and different from $mno + opq = A + B$. If there is no such common point, there must be some relation between A and B ; but if we are to *apply the idea of a relation X to A* , there must again be a point of identity. A must contain, as an element, one of the terms necessitated by the relation X . If X be a space relation, A , whatever else be its character, must be also spatial. So with B . Otherwise X will not be applicable to A and B . Here, then, we have mediate connection by points of identity. Now suppose that A and B are neither related by the possession of a common point nor by a relation applicable to the two, then in what way are they related? And if not related, how are they combined? I conclude, then, that the elementary act of imagination consists in the application of one content to another, by taking a point in each as common to the two. Any given imagined content may be the result of one such application, or of the same act repeated over and over again. And notice that in every case, if this is the true account of imagination, the elements of the imagined whole are all derived from the *given*, whether these elements are terms or the relation of terms. The operation performed on the given consists merely in the act of application.

2. But this operation upon the given produces a result that has not been given. It is the "application" of one ideal content to another, which forms the assertion or suggestion of "new" cases, i.e. which extends our knowledge, belief, or fancy far beyond the narrow circle of our own present or past experience. The extension thus effected may have one or both

of two aspects. First, the whole now formed may differ qualitatively from anything previously experienced. This is the special case of imagination. Or, secondly, whole and parts may both qualitatively resemble contents already experienced, but they form a new individual instance. In this second case, which affects inference more particularly, the work of applying contents to one another is equally real and important, and a word may be said upon it in this place. Take any simple inference; e.g. judging from my partner's lead at whist, he has a strong hand in hearts. What happens here? A general idea or belief in my mind connects such a lead with such a suit. Here in the case before me the lead is given, and applying the idea to the present through the point of identity, I judge the character of the unseen hand. Now the whole in this case—the total character of the hand—is not dissimilar to cases that have been given, nor is that part of it which is added by my construction to the given. The case, then, is not "new" qualitatively, but it is a fresh individual instance not yet experienced—at least not wholly given in experience—about which I nevertheless form an idea or judgment, taking into its scope the very part not experienced. I am acquainted with strong suits, but that this particular suit is strong I infer, that is, I judge without observing it. It is then a "new" case.

But this new case, it may be said, "falls under" the general idea. It is a case of that idea (as we saw in analysing the qualitative judgment). Is it then wholly new? To this we must reply—(1) The idea, as such, merely suggests contents of reality at large. It does not, as such, *assert* any fresh instances of them beyond those already known, the number and spatial or temporal diffusion of its content being indeterminate. This present judgment *asserts* the content; and on this side, then, the application of the idea transforms suggestion into assertion. (2) The idea suggests its content indefinitely of reality, and not in relation to this particular case. This relation is effected only by the application as such. (3) Lastly, the generality of the idea as such, containing, as we saw in our original discussion (Pt. I. Chap. VIII.), a trace of inference, itself involves in a looser form the elements of that extension of our thoughts beyond the given, on which we are now insisting.

We are given a content A. To form it into the ideal A is, as we have seen, if A is explicitly realised as general, tantamount to the suggestion of cases A_1, A_2, \dots, A_n , perfectly indefinite in number and position, but still suggested of reality as resembling, and therefore other than A. This indefinite and therefore incomplete suggestion is made definite and full when

we "apply the idea of A"—transformed into an assertion if we are inferring, made into a definite suggestion if we are imagining or supposing. We may then separate two stages in the suggestion or assertion of the "new" fact, corresponding to the formation and application of the general idea; but however we divide up the process, the result, with which we are at present concerned, is that in imagining or inferring we deal with a new case. And that we are able to do so postulates a factor in knowledge of which we have hitherto had only subordinate and unimportant traces, namely, the power of extending our thoughts and beliefs beyond the area of perception and memory, which is the leading feature in imagination and inference. The broad principle of this extension is that contents resembling given facts may be suggested, and, under certain circumstances, definitely asserted in new relations; and the carrying out of this principle depends, we can also see, on the formation and application of general ideas and judgments.

Since imagination uses general contents derived from apprehension, and consists in the application of these to one another so as to form new wholes, its limits will now be clear on both sides. It builds (as Lotze held all thought built) with stones that are already hewn. It uses the product of abstraction as its materials, and with these pieces, dug out from the matrix of the given, it constructs a new fabric. On the side of abstraction it is limited by the impossibility of separating those contents, the like of which have never been given in separation. On the side of construction it is limited by the necessity that the elements which it combines should be applicable to one another. Each brick in the building determines in some degree the next, even if only in the form of the bed on which the new brick is to lie. Combinations of ideas, in short, are limited by the points of contact between them. In combining A and B it is the whole A B that is new, not the A or the B. But A can only be applied to B by finding a point p common to the two. To assert A of B, to combine A and B when there is no such common point, is simply nonsense; for either it is to invent a common point, and then it will no longer be a combination of A and B but of something else, or it is to ignore the necessity of a common point, and then there will be no combination at all. This is why it is nonsense to speak of a tall sound, for tall involves surface, and sound has no surface to which tallness can be applied.

3. Two special cases of imagination require notice before we end our discussion. The first is that of imperceptible qualities. I say qualities, because I wish to make clear that the special

question arises only with regard to contents lying beyond the limits of our perceptive faculties. The centre of the earth is imperceptible for physical reasons, and the Rome of Cicero's consulship for temporal reasons. But there is no more difficulty in imagining anything as the centre of the earth than in picturing the North Cape; and it is as easy to have a mental vision of Cicero's view from the slopes of the Palatine, as of the Sultan's view over the Golden Horn. The difficulty arises where we imagine that which *ex vi termini* never is nor ever can be perceived, either itself or the like of it. We imagine physical atoms, the ether, degrees of cold and heat far beyond experience, or, in a different range of feeling, a "more ample greatness" than is to be found in this everyday world—

"The light that never was on sea or land,
The consecration and the poet's dream."

In many of the more complex instances of this kind we might really find simple cases of the ordinary constructive imagination which we have described. But take the case of physical atoms in which you may believe or disbelieve, but which you cannot deny to be imagined by clear-headed people. Now one characteristic of an atom is its imperceptibility. Not only is it invisible at present, but there are theoretical reasons which lead us to infer that no extension of our powers ever could make us aware of its qualities by direct perception. The question, then, is this,—if imagination is limited to the combination of elements similar to facts of apprehension, how can it ever suggest a quantity the like of which can neither be perceived nor be explained as compounded of perceptible elements?

The notion of a quantity smaller than any that is perceived is, I imagine, obtained by applying to any small quantity the idea of proportion derived from the comparison of the ordinary quantities of which we are aware.¹ Comparison exhibits between all extended magnitudes definite kinds of resemblance which we call proportion, and proportion is applicable to all of them indiscriminately, i.e. without regard to the *absolute* quantity compared. A foot is twelve times an inch, just as a mile is twelve times 146 $\frac{2}{3}$ yards. The relation appears to attach correctly to quantity as such. Then apply it to the smallest quantity visible, or, if that be indefinite, say to the microscopic unit μ ($= \frac{1}{254000}$ inch). We can regard this unit as one term of a proportion which must have another term imperceptible to us. We apply to it the idea of a pro-

¹ Cf. Berkeley, *Principles*, § 127.

portion, and, as the result, arrive at the imaginary idea of $5000 \times \frac{1}{16}$ inch. The peculiarity here is this: In the cases dealt with above, A_1 , a content like A , is applied to B_1 , a content like B , and a whole AB is formed unlike any given content. Here the idea of a relation¹, is applied to the known content μ , and the result is, not a whole μ , unlike anything known, but a new content ν which cannot be regarded as compounded of μ and ν as elements.

The case of an imagined point in space is somewhat analogous. A point A is known; apply to it a known distance $\alpha - \beta$ in a known direction, and you arrive at an unseen unknown spot x . x , it may be said, is like any other spatial point known, for spatial points have no distinguishing character. But they are distinguished by position, and it is precisely in its position that x differs from all known points. Nor can its position, though determined by A and $\alpha - \beta$, be regarded as compounded of them. Imagination, then, is not necessarily confined to the construction of a new whole out of familiar elements. It may suggest new elements too. But in either case it is limited by the nature of the general contents at its disposal. Its only material available consists of contents formed from given facts, and its only method consists of applying these contents in new ways. Whether it forms its data into new wholes, or suggests new contents as elementary or "simple" as the data themselves, the same law holds that imagination is limited by the possibilities of applying ideal contents to one another.

4. The second class of ideas requiring some additional clearing up are those which are sometimes distinguished by the prefix absolute, and which might perhaps be ranked conveniently as "ideals." Some of these, again, are clearly enough constructions or abstractions—the perfect man is a fusion of many characteristics, a fusion which itself involves also a good deal

¹ Some objection may be taken to the phrase "applying the idea of a relation." A relation, it may be said, apart from the terms related, is an impossible abstraction. If I suggest b in relation to a , I must in some way have b in my mind along with its relation. But here, according to the hypothesis, I only get b by means of the relation. It would perhaps be better to speak of applying a process. From A , by the process of division, a kind of analysis, I get B , and I apply the same process ideally, though I cannot do so by actual perceptive analysis, to the content a , and get b as my result. The same applies to the illustration which follows in the text. The spatial relation $\alpha - \beta$ may be said to involve the points A and x which it relates, and it is therefore better, perhaps, to think of the determination of x by an ideal continuation of space from A , limited by a line of known length $\alpha - \beta$. But in either case the result of the process is tantamount to the application of an ideal relation to a known or ideal term; and this, rather than the way in which the process itself is to be conceived, is what I wish to insist on at present.

of abstraction from men as we find them. It is just worth noticing, as we pass, that ideals are mostly interesting or vapid according as the element of construction or abstraction preponderates in them. Types in which differences are left out, in which you try to get down to the pure thing, free from all incrustation of other elements, are nauseating in proportion as their delineation is successful. This kind of "idealism" gives us the conventional heroes and heroines who live to utter moral platitudes, and spoil whole chapters of good writing. It inspires the morality which tries to make all life a study of what you ought not to do. The constructive idealism, on the other hand, finds dissatisfaction always in incompleteness, and finds completeness only in the many-sided character and the varied life; and from it come the Dantons "fiery, fuliginous," who sometimes devour the "atrabiliar sea-green formulas," and sometimes are devoured by them, who sometimes sink and sometimes swim, but who, whether they succeed or fail, are always interesting. Old Glaucus of the sea may, after all, be more beautiful seen as he is with the shells and seaweed grown about him, and his poor limbs maimed and broken by the battering of the waves; and should we succeed in stripping these off, and getting at his original nature in its naked purity, the result might be commonplace and disappointing.

Understanding, then, that the best ideals come mainly under the head of our constructive imagination, we have still to consider the case of the "absolute" ideas, which resemble those recently discussed in this, that their contents can never, as it would appear, be matter of actual apprehension. Those who know are never weary of insisting that we never perceive an absolutely straight line, or two entirely equal quantities; yet we use the conceptions every day in our mathematics.

But, to begin with, there seems to be a little confusion here. Numbers of straight lines turn out to be crooked. A more minute investigation discovers a curve or an irregularity; but it does not follow that I do not see them straight to begin with. As I look from the Cotswolds over the Roman road, a great portion of it seems, at first sight, quite straight. Walking along it, I discover slight irregularities, and afterwards I can see them. But then the content of my vision has substantially changed. I could not see any inequality in length, breadth, size between these two quantities; but, now I mention it, I think I can detect a slight difference. Here, again, the content of the first apprehension is equality. I take it, then, that though there may be no straight lines in nature, and no equal quantities, yet we see quantities equal

and lines straight. Straightness and equality are given ideas. No doubt they are definite ideas; and, as definite, they are not formed all at once. An inexact boy maddens his mathematical master by his easy-going readiness to accept approximations. Practically equal and about straight are definite enough ideas for him, and the first stage towards the quantitative judgment proper is the clear distinction of our exactly's from our nearly's. But here an *ἵερὸς* lies in wait for us in the shape of the infinitesimal. Distinguish the contents given as straight from the slightest perceptible curve, and you have yet the imperceptible curve to deal with. Lines perceived most definitely as straight may turn out to be segments of a very large circumference. Now, how can you perceive an absolutely straight line distinguished from such infinitesimal curvature? Quite clearly you can no more perceive the one than you can the other.

Notwithstanding that, the contents are distinct. In the straightness which you are aware of there is no curve given. In the imperceptible curvature, as it is determined by the conditions of its suggestion, there is curvature. The contents, therefore, are distinct, and by absolute straightness we may mean only the definite idea of straightness as distinct from the least possible curvature. Such an idea would be identical in content with that of definite straightness.¹ It would be the self-same idea applied more carefully and therefore more narrowly.

But to what could we apply it? Analogy offers a suggestion. The loose indefinite idea is that which is found by sterner analysis to have been applied to apprehended contents of more or less varying character. It becomes definite when restricted in its applications to such contents of apprehension as are identical in their given character. But the consideration of the limits of discriminative apprehension, as made clear to us by the use of instruments and by calculation, pushes the requirements of definiteness a step further. The idea arises that in apprehension the mind is in contact with an object existing otherwise than in the apprehending act itself; that this object is the stimulus of apprehension, and that apprehension—which in relation to the object we call perception—more or less perfectly corresponds to it. From this conception—

¹ It would at least be modified only in so far as a fuller knowledge of that which it differs from can be said to modify a content. Its character to analytic attention would be the same, but more would be known of the relations of difference and close but inexact resemblance in which it stands. More, that is, is known "about" it, though for "direct" knowledge it is unchanged.

into the history of which we shall have to enter later on—we get for this department of our subject a contribution to the idea of definiteness. For it suggests that the same stimulus produces somewhat different perceptions at different times or in different subjects; while, on the other hand, somewhat different stimuli produce the same perception. Perception will not notice a difference in the weight of two bodies, the intensity of two lights, the length of two lines, and so forth, until this difference reaches a certain limit; what that limit is differing in individual cases, as it is written in very many psychological treatises. Now the “absolute” content is that which conforms “in itself”—an expression which we may be allowed to use provisionally—to the character of the perception. The content “straight” will be given as the result of many varying stimuli. Among these one kind only will be absolutely straight,—i.e. considered as they are apart from perception will actually conform to the content of the perception—or, to put the same thing in a different way, would still appear straight if our sensibility to differences of direction were raised to the highest possible pitch. The ideal straight, if you like to put it so, is that which would appear straight to the ideal perception. Here, then, we have found a sphere of application for our “absolute” idea. As applied to apprehended contents, it is not distinguishable from the definite idea. As applied to the object of perception, it will be true only of a narrow circle falling within the wider number of objects which awake in us the perception of the definite content. The absolute idea, or the ideal, I conclude, is a content similar to definite ideas that are given, but distinguished from imperceptible as well as perceptible differences, and asserted, therefore, of the objects of perception, not of the perceptions themselves. We are introduced here to conceptions which take us beyond our present limit, but we have no reason, on account of these ideas, to modify our general views of imagination.

5. The account of ideas in this chapter is, in some respects, complementary to that of Pt. I. Chap. VII. We dealt then with the “first universals,” the barest necessities of existence for the judgment. Here we deal with more complex and more refined contents formed by the application of these “first universals” to one another. We might perhaps call the contents so formed, generically, conceptions. But in doing so we must avoid the pretence now associated with that word of some insight into the connections of the elements composing it. We have not hitherto distinguished the wildest imaginations from

the most sober results of a plodding induction. The sublime and the ridiculous, the noble and the worthless, the true and the absurd, are not yet differentiated. The theory of gravitation and the Babylonian mythology, the ideals of Mazzini and the aspirations of an Anglo-African filibuster, the *Iliad* and a Society novel, have, in their formation, this much in common. Why one idea gives us insight and grip of reality, while another ends in smoky nothingness—why here we have the apples of the Hesperides, and there the dust and ashes of Piccadilly, are deeper questions. The breaking up of given contents and their reconstruction into conceptions may be arbitrary and fanciful, or it may subserve certain higher interests. Of some of these interests, such as the æsthetic and the moral, it is not our business to speak. But we have now to consider how these processes are modified or developed when the service of truth is in question. How can our conceptions give us insight into reality; and how, with that end in view, must they be formed?

CHAPTER III

INFERENCE—GENERAL CHARACTERISTICS

1. *Prima facie* inference resembles imagination in having to do with contents which are not and never have been given in apprehension. A content on this view is inferred when we are able to assert without having ever apprehended it. It may be or might have been inferred when, though it actually happens to have fallen under our observation, we should have been no whit the less in a position to assert it independently of this chance. The special business of inference is to give us a "new" fact, the word "new" meaning precisely that the fact in question is not contained in any observation hitherto made by the mind. But this again is ambiguous; and if the criterion of inference is the "novelty" of its conclusions, we must inquire further what precisely constitutes a *new* fact? What is contained in observation and memory? Where does memory cease and inference begin?

One would naturally think this the easiest possible question to answer; it must surely be resolvable in every case by a moment's introspection. Either I remember or I do not remember; and if I assert that which I do not remember, then I infer. Surely memory, if it is worthy of any evidence at all, must know where to draw its own limits, must know what it contains and what it does not.

If this were so it would very greatly simplify our task, but unfortunately the slightest acquaintance with the value of human testimony shows that it is not so. The special weakness of an eye-witness' evidence lies not in shortness, but in vagueness and confusion of memory. And a prominent factor in this confusion is precisely that not one eye-witness in a hundred can adequately distinguish what he saw or heard from what he inferred. Nay, seeing and hearing themselves, as we ordinarily use the words, are applied to what are for logical analysis undoubted inferences. I "see" my brother or "hear" a dog bark, if you like so to apply the words in

conformity with ordinary usage. But the seeing and hearing are logically complex acts, involving first an apprehension of a coloured figure or a sharp irritating sound; secondly, a recognition of the content apprehended, that is, a qualitative judgment subsuming it under its class; and thirdly, an inference from it to the remaining qualities exhibited by "my brother" or "that dog," qualities which have been previously experienced in certain relations more or less definite to the content now given. Of course, I do not mean that the mind goes through all these stages when I recognise my brother or express my feelings about a barking dog. The actual concrete state of mind which issues in the statement of what I see would, perhaps, if dissected, exhibit embryonic traces of them, but the point for logic is that the statement can only be justified and sustained on the assumption that each of these stages is also warranted. My brother is not directly apprehended as my brother. Aspects or characteristics of him are given, but he himself is always an inferential construction.¹ Now, if you cannot even know your own brother without inference, it is clear that the boundary line between the given and the inferred is not to be drawn in accordance with the first hasty deliverances of consciousness and memory.

It is not easy, therefore, to decide in particular cases, either by introspection or by the form of statement, whether the conclusion is or is not stating a fact which is "new" as compared with the premiss. Can we then lay down any theoretical criterion? Can we fix a meaning for the term "new" as applied to an assertion? We shall see that there are two possible meanings, and that it is not very easy to decide between them.

(a) According to one quite intelligible and consistent account, any assertion is "new" (as compared with some other) as long as the two contents are in anyway distinct. Whatever the real inseparability of the facts, as long as they are distinct, to pass from the one to the other is to make a new assertion. Thus they may be merely aspects in a single content of perception; and if so, they may be regarded as forming one reality, as being in reality one. Nevertheless, if they are distinct, to assert the one is not necessarily to assert the other, and to pass to the other is to make a fresh assertion. Thus, if an object is felt as hard and cold, it cannot be said that these attributes exist apart in any intelligible sense. Yet the one by no means "carries" the other. If I tell you

¹ He is only perceived, according to Aristotle's well-known distinction, *καὶ ὡς ἐκείνους* (*De An.* iii. 1).

that it is hard, you will still have to guess its temperature, and when you have found it out it is a new piece of knowledge. For though these contents are abstract, and must qualify some whole, it does not follow that they always qualify the same whole. In the content, "bright blue," again bright and blue simply qualify one another, and yet they are perfectly distinct contents, and to predicate the first does not commit you to the second. Conversely, to assert either on the ground of the other would be to make a new assertion, and so (according to our present account) to infer. So far, then, it appears that the nature of the contents or of the real connection between them makes no difference. As long as they are distinct, to pass from the one to the other is to make a new assertion.

Nor is this all. Analysis distinguishes not merely element from element, but elements from whole, or, more properly, discovers elements in a whole. Conversely, construction forms wholes out of elements. We have insisted (Pt. I Chap. XII.) that a true advance is made by thought in this operation. We have seen that though the same reality is referred to throughout, the judgment gives that reality more fully than either term taken singly and apart from the act of judging. We must admit, then, that to assert the reality referred to by either term, *e.g.* the subject,¹ is not as such to recognise the whole reality dealt with by the judgment, and hence we must allow that a whole on the one hand and the parts which form it on the other, may be contained in different assertions, and that, whichever we start with, to proceed to the other is to make a fresh assertion.

In construction the whole is recognised as a whole for the first time. It forms now the content of one act of thought, and that for the first time, however much it may have been given part by part before. And this seems to be a new and real step. Conversely, in analysis the element in fact contained in the already known whole is now made a distinct content of assertion on its own account. To recognise the whole formed by given elements, or to distinguish an element in a given whole,

¹ It may be asked, Can we assert the subject in separation, or is it not, as suggested above, an unreal abstraction? We must reply that it only becomes an abstraction when taken as an element within the judgment. We may, *e.g.*, assert a whole without analysing it. But when this whole becomes the subject in the judgment which analyses it, the process of analysis has already begun, and the whole is already ceasing to be the mere unanalysed datum. To fix it as such is really to isolate it from the judgment. Hence the impossibility of precisely defining the reference of the subject of a judgment *qua* subject. It passes continuously into the "remainder" of the content, and to isolate it is now to make an unreal separation.

must then be admitted as a new act of thought. We may say that a content is "new" if it has not already been the whole of, or a distinct element in, a previous single act of assertion.¹

(b) But inference, as we shall hope to show in the sequel, is not confined to "new" assertions of this latter character. Its conclusions are not merely wholes of which the parts have been given, or *vice versa*, but also "new" facts in a more unequivocal sense. When I argue from the appearance of the sky to the probabilities of the weather for to-morrow, I infer that which is neither matter of apprehension, nor contained as an element in my premiss, nor a whole which my premiss constitutes for me. To-morrow's weather is unequivocally beyond the given: it cannot then be contained in any judgment which merely analyses, constructs, or otherwise correlates given facts. If it be "contained" in any judgment at all, that judgment must be one which "goes beyond" the sphere of hitherto apprehended reality. And we shall try to show that in numberless instances inference does take this step, does lead us to facts which are "new" in this special sense. It is "novelty" of this more special kind which is thought of when inference is conceived as essentially a process from "the known to the unknown," from the given to what is beyond, and so on.

We have thus obtained two definitions for a new assertion. "New" may mean simply distinct; and in that case, if all passage to a new assertion be inference, constructions and analyses will be inferences. Or the "new" may mean precisely that which is neither an element to be detected in, nor a whole constructed of, given contents, but some further

¹ A content asserted as a distinct part of a whole is, without doubt, asserted as such, and to reassert it by itself may be justifiable as a matter of verbal arrangement, but is mere repetition. To say, "Brown and Jones both came: yes, Jones came," simply states one thing twice over. It "leaves out" but does not analyse, and, badly stated, appears false like the old inference from "all" to "some"; but may sometimes have its point as a matter of verbal economy.

Hence we can deal with an objection which might be taken to our account on the ground that, according to an earlier chapter, contents never separated by analysis may be distinct and yet inseparable by thought, so that, as we urged, to assert or in any way think of the one is to assert or think of the other. But it is a question of distinctness. We cannot, if our previous account be true, distinctly conceive length without allowing it some breadth, but our analysis of the content may be so obscure that we are not aware of breadth as a distinct element in it. In such case the judgment, "however much you try to conceive mere length, breadth still remains in your conception," is a "new" assertion. It admits as distinct what was before an unrecognised element in the conception. If, conversely, the whole content length with some unspecified breadth is distinct, there is on our showing no new assertion when we recognise breadth, and *omni quodvis*. The point is important, since all analysis and much of construction is a matter of rendering distinct.

fact lying outside the whole which forms the premisses. In this case construction and analysis are not inferential, and we must look elsewhere. We shall not find ourselves able to adopt either of these results. For, on the one hand, we shall see that there are operations ordinarily regarded as inferential which are purely acts of construction or analysis. Hence we cannot adopt the narrower meaning, and confine the name of inference to processes leading to "new" facts in that sense. On the other hand, we shall have to admit that the use of construction or analysis as such does not differentiate inference from judgment. If, therefore, there is any generic character belonging to inference as such, we must restrict it to some special class of these operations. It appears, then, that our attempt has failed, that we have not found an adequate differentia for inference in the conception of a process leading to a new assertion, and that we must look elsewhere.

2. Inference, then, it may be suggested, like judgment or any other mental operation, starts with a datum, treats it in some definite fashion of its own, and brings out as result a new thought. Thus judgment starts with apprehension, analyses it, summons ideas to its aid, and produces a qualitative or descriptive result. Similarly, inference starts with a premiss or premisses, combines or analyses them, and produces a conclusion. So far, it may be said, they are alike. The difference is in the explicitness of the distinction between datum and result, and reduces itself to a question of degree. For, first, in inference the separation and consequent connection of premisses and conclusion may be conscious or unconscious; or rather it may appear for thought in any degree of clearness or obscurity. Thus we may make a judgment which, in fact, depends on certain logically prior assertions, and to these we may make no overt reference. Or our reference to the premisses, or our verbal statement of them, may be confused or inadequate in any degree. Conversely when we judge the distinction between datum and result must always in some obscure way be there, but the explicit statement of it fails altogether. Judgment, then, on this view, is merely the lower limit of inference, where datum and result are frankly fused in one statement. The logic of both processes is the same. In both, thought begins with A and elaborates it into B; but in the one it simply asserts B without explaining whether it is datum or result, and so it is judgment, a simple assertion that is not at the pains to justify itself; in the other it makes this distinction: its datum is specified, and becomes the premiss, and its result is marked off and figures as conclusion. And between these clear cases

we may in concrete thought have all kinds of intermediate stages; and it is, as has been rightly said,¹ "the merest chance" whether we adopt the more or the less explicit form. "He must be a fool," is an undoubted judgment. "A man who acts like that is clearly a fool," is in judgment form, but the distinction of ground and consequent is already made. Turn them into separate judgments with a connecting particle, "he did this or that" (premiss), "so he must be a fool" (conclusion), and we have formal inference.

Now here, it will be obvious, there may be endless gradations; and if by inference is meant *the process which the mind actually goes through*, it will be true to say that there is no clear line dividing it from judgment. Between the mere assertion of the conclusion (or of premiss and conclusion in one comprehensive word or phrase) and the full statement of ground and consequences there are all degrees of explicitness, and it would be impossible and nugatory to inquire at what precise point we are to say that the mind has begun to go through an inference, that is, to make a definite advance from premiss to conclusion; we might perhaps put it that judgment becomes inference in proportion as its content breaks up into assertions which are distinct and yet connected, i.e. into premiss and conclusion. We could not draw a precise line on this principle, but we might distinguish well-marked stages. The real conditions on which a truth rests are fixed and unchangeable; and a thought is more or less developed in proportion as it recognises them more or less clearly and fully; but this is a matter of degree, and as a matter of degree the distinction must on these lines be treated.

3. But it seems possible to draw a sharper line following a deeper distinction. In every intellectual act, if we except simple apprehension and perhaps memory, there is involved a process which starts from a datum and arrives at some further result. So far, inference is in the same case with other acts. The difference is that these other acts take the result as given, they assert the whole or the part because they find it, not because it follows from the original datum. The datum tends for them to be a starting-point in reality around which they make further investigations, and so find the result. Inference, on the other hand, makes its datum the *condition* of its result. Its conclusion *must be* because its premiss is. It is then not merely the assertion of a new fact, but such an assertion based upon another fact as its condition. What the term "condition" means, and how much we know of it, we shall

¹ Cf. Bouanquet, *Logic*, vol. i. p. 89.

inquire in Chapter V., and the discussion of different types of inference will have to show whether our criterion is tenable. But if there is a distinction between inference and other acts of thought, it would appear to be that in inferring we treat a datum as a condition from which consequences follow, and assert those consequences without waiting till we "find" them.¹

It must be added that the term "inference" applies properly to this process of development as a process, and not to its result. That result is a conclusion, and any judgment is logically a "conclusion" when to make it implies an inference. And an inference, we may say, is implied, not only when a conclusion has originally been arrived at as the consequence of a datum, but when it can only be justified or supported on such a ground. Thus we may be unconscious of the inferential process, but the logical character of a judgment as conclusion would not be affected by this. It would still depend for its validity on the premisses; we could only maintain it by showing that it follows from the premisses. Thus, when we speak of a judgment as logically implying an inference, we need not determine whether that inference is explicit or not. The inference is implied if it is the only means by which the judgment could be substantiated.

Inference, then, is distinguished from other acts of thought, not merely by starting from a datum and arriving at a new assertion; nor merely by making the distinction of its datum and result explicit. It does make a "new" assertion, and it does in its higher phases explicitly ground this result upon an assignable datum. But neither of these features mark it out generically from other intellectual acts. Its distinctive and essential mark is that it treats its datum as a condition from which its conclusion follows as a necessary result. From this flow all the consequences which we have discussed, and which have been noted since Aristotle's time as distinctive of inference. Explicit inference has certain *premisses laid down*, from which we start, and it is a process in which a "new" assertion follows necessarily as consequence from the reality laid down in the premisses (*ἐν τῇ τι τὰν προτίθεται ἐξ ἀνάγκης ἐκβαίνει τῷ ταύτα ἵστα*). This is explicit inference. But infer-

¹ Cf. Bradley, *Logic*, bk. iii. part i. chap. iii. §§ 11 ff., and chap. vi. §§ 11, 22. Here, as elsewhere, I have often made use of Mr. Bradley's admirable phraseology while not wholly falling in with his results. Mr. Bosanquet's view (*loc. cit.*), that inference should ultimately be reduced to a single judgment, contains a certain truth, but not, I think, the most important part of the truth. If you treat inference as a kind of judgment, it is a very special kind, and the difference, I should have thought, is more important than the resemblance.

ence is implied wherever the conception of condition and consequence works, as we say, unconsciously, i.e. wherever we make an assertion as though we had reasoned from premisses, wherever our assertion can only be justified by a knowledge of premisses from which it follows as conclusion.

By the use of the conditional relation, thought is emancipated from the confines of the given. It can pass beyond experience and reach the "walls of the world." Hence the salient fact about inference, its power of giving "new" truth in the narrower sense of that term,—truth which is neither compounded of given elements, nor analysed out of given totals, but is beyond and separate from experience. Not all inference gives us results of this kind, but wherever we have results of this kind they rest on inference.

The operation of inference in this direction is much disguised in our mental processes as they actually take place, and still more in their linguistic expression, by the inexplicitness to which we have already referred. But however much actual statement, actual mental process, may intermingle premiss and conclusion, the line between them can always logically be drawn, is always logically there. Take a simple case. "There goes the Cornish express," says more about the object than the mere sight of it gives me. The conditions here fall logically into the qualitative judgment that merely classifies the given facts and the inferential step beyond them. But in actual statement we make but one proposition, or perhaps veil the real transition to the new content by bringing the vital part of it into the statement that poses as premiss. Thus the gist of the conclusion may fall within the term that seems merely descriptive of what is given. Thus you would not say, "This is snow, it is cold," since snow so distinctly suggests a cold object. Still I know it to be cold without touching it, and hence I seem to extend my knowledge beyond the given by merely judging. But "This is snow" is *not* a qualitative judgment pure and simple, it contains an inference. The qualitative judgment proper merely compares what I now apprehend (say a dazzling crystalline whiteness) to contents previously apprehended, subsumes the given under its idea. The true qualitative judgment would be, "This is dazzling," etc., and the inference then stands out from it, "This is cold." "This is snow" is simply *another* inference from "This is dazzling," etc., and a richer inference to boot, containing cold within it.¹

¹ Of course, if all the attributes which the term snow means for me can be given at once, "this is snow" ceases to be inference. I assume in the text that the term contains too much for this to be possible.

If, then, we stand by the qualitative judgment's essential character of comparing the given to a general content, we see precisely what inference adds to it, namely, the assertion of another content as characterising or in some way true of the given. So much, then, at least, in any statement is inferred, whether knowingly or not, as is not matter of apprehension or memory, or a construction of apprehension and memory. And this is, in the stricter sense, the meaning of the "new" fact which is not "given."

It may be objected that we have taken the qualitative judgment in an abstract and unreal sense. "This is snow" is surely a pure judgment, whatever its constituents. Doubtless it is a judgment, but we are now concerned with its conditions, and we assert that it implies, not only apprehension and memory, but inference, and an inference which asserts that which is not given. "Snow" is a name for a certain body of attributes¹ found to hang together, and expected always to hang together. In this expectation (without which the word would not be applied on such a partial examination of the object as would generally be held sufficient) an inference is contained. Such judgments express the results of an inference, depending, as we shall see, on generalisation, and when applied to given facts are covert inferences with regard to those facts.

It would be unintelligible that a judgment should thus contain inference if inference were something which in life, as in treatises on logic, came *after* judgment. Of course there is no such temporal order of development. Inference may in some ways be a "higher" order of mental activity, but there is no shadow of evidence that it develops later, or supervenes upon judgment, whether in general or in special cases. As soon as a fact is apprehended the mind is stimulated to make analyses of it, to compare it, to note its position, and so on. But *pari passu* with this the fact suggests other contents, and each comparison made in the same way carries its suggestions with it. The actual judgment, then, does not depend on mere memory, but carries expectation with it. But this need not confuse our view of the conditions on which judgments are made. Few, if any, of our mental operations depend on any one condition in complete isolation from all others. But our object is so to dissect all kinds of operations as to strip the conditions bare and force them to light. We never get bodies acted on by a single force, but that does not prevent us from disentangling the effects of the many forces that are combined.

¹ I.e. it is at least this. I do not here inquire what more it may mean.

Logic, like physics, is a study of abstract conditions which are given only in the concrete. And thus in the case of inference our plan is to consider, not only what precise form an inferential operation may assume, but what conditions it implies. If we take the factors of knowledge hitherto analysed for granted, we have to ask what further factors does inference of this kind involve? The first of these, if we accept the analyses just given, is that application of familiar contents to new data which we found to distinguish imagination. The two distinctly marked stages, the ultimate logical premiss and conclusion, are the recognition of what is given and the further assertion; and this division is fundamental because it rests on a distinction of conditions, the premiss being given by some or all of the first four factors of knowledge, the conclusion by the fifth factor involved in the application of an ideal content to a new case on the strength of the conditional relation.

4. In defining the sphere of inference in this direction, one distinction should be noted. The conception of unconscious or implicit inference demands perhaps a further word of explanation. Inference is implied by any assertion which can be justified only by being connected as consequence with some given fact as condition. Where this latter fact has "operated" unconsciously¹ upon the mind an implicit or unconscious inference is drawn. But where there is no fact to "operate" there can be no inference, conscious or unconscious. Whether for judgment or inference, the point of departure is psychological, not physical. What is given is the content of apprehension, not its physiological stimulus. In all ordinary perceptions these are two very different things. Given any excitement of the sensory nerves strong enough to reach the brain, and the effect generally, in all likelihood invariably, propagates itself yet further in broadening waves of excitement, and the actual consciousness corresponds, as Professor James puts it, not with the bare excitement directly caused by the sense stimulus, but with the whole simultaneous disturbance. It is this broader excitement which determines the actual content of apprehension, and apprehension itself may in this way be regarded as sometimes of the nature of an unconscious or physiological inference from the peripheral stimulus. Often it is a bad inference. To give a familiar example. Macaulay read by pages; most men read by sentences or lines;

¹ I use an ordinary phrase without inquiring into its real meaning. I suppose that in fact a "subconscious" operation is an ambiguous term, covering (a) processes going on upon the "fringe" of consciousness, and (b) pure physiological processes with results in consciousness.

very few indeed, except learners, read by letters. In all these instances, though in varying degrees, a limited physical stimulus, a part of the word, sentence, or page, stimulates the mind to construct rapidly a consciousness of the whole,—of the meaning, and even of the actual words on the page. This is why misprints escape the notice even of a careful reader. The correct portion of the word or phrase, operating upon a prepared attention, constructs a vision of the whole as it ought to be, not as it is.

These "physiological inferences" should be distinguished from "telescoped" or inexplicit inferences. In "There's my brother," no doubt the mental state is single, but upon cross-examination it admits of analysis, and a "subject" who is innocent of physiology can dissect his statement into ground and consequence; that is, he can tell you with more or less accuracy how much he actually "saw," i.e. apprehended, what part memory played, and what part inference. There is here, then, a building up of data which may be separated. The judgment can be analysed into an inference. When, however, we go back to the apprehended content, this can no longer be done. Given a certain stimulus, and I apprehend a sound. No analysis of this content will enable me to detect the element due to the direct stimulus, and separate it from the effect of the broadening wave of excitement. This dissection may be effected, but not by direct analysis. It requires comparison of the relations of stimuli and sensation in many cases and in different subjects, and generalisation of "laws" from such comparison. The ultimate datum, then, for any inference taken by itself is the apprehended content assignable by the subject, and the physical stimulus is as truly inferred from this in the one direction as the wider or exacter affirmation in another.

5. To inferences giving "new" conclusions in the narrower sense, the objection may be taken that if the inference is sound the conclusion must be somehow contained in the premisses. Somehow certainly, but how? That is precisely the whole sum and substance of the question of inference, and those who offer the remark as any solution of its difficulties are merely suggesting a way of putting them out of sight. The conclusion must be contained in the premisses in the sense that it follows from the premisses, but not necessarily in any more definite way.

It is true that there are inferences falling legitimately under this formula. When the inferential process is one of construction or analysis, we may say that the premisses con-

tain the conclusion, and mean what we say. But to say the same of all inference is either a truism or a violent and arbitrary assumption. If it means that the conclusion must be "virtually contained in," i.e. must depend on, the premisses, it is a truism. If it means that all inference is of the type of construction and analysis, it is an assumption. The whole question of generalisation as a basis of inference is this: are there principles which will lead us from one content to another, where that other is neither a whole constructed from the first, nor an element distinguished in it? If there are such principles, what are they? And when found do they commend themselves to our intelligence? Inferences commonly made do commit us to such "advance" beyond the given. We assume provisionally that they are valid. They may ultimately turn out worthless, but to deny them in advance on the ground just mentioned, is either a simple irrelevancy or a *petitio principii*.

In fact, in our view inference of this kind—we may say ultimately inference of every kind—is from the known, i.e. what is or has been given to the unknown, i.e. what has not yet been given. We are told, indeed, by one celebrated writer that this cannot be, since it is only so far as the unknown becomes known that there can be any sound inference made.¹ I cannot, that is, get knowledge which I have not yet got, because then it will be knowledge, which it now is not. By the same reasoning, I cannot walk across the street, because then I shall be on the other side, which now I am not, and because the other side will become my side as soon as I have got there.

Inference must always assert a separate content. But our discussion has shown that this "separateness" may be attributed to two very different kinds of relation. On the one hand, there are contents not hitherto indeed asserted as such, but derived by construction and analysis from contents already known or believed. On the other, there are contents not so derivable, but still more completely separate, but at which we believe we can arrive by a new method of thought, involving the application of contents to new data, and ultimately what we call generalisation. To the first process the formula that "the conclusion must be contained in the premisses" strictly applies. To the second it is not usefully applicable. But both claim to be real processes, to extend our knowledge, to give us "new" truths, and

¹ See Green's *Philosophical Works*, vol. II. p. 281; and cf. Boussuquet, II. p. 170 ff.

in one essential feature of inference both processes agree. "New" assertions are not "shot from a pistol"; they are not made in the air, but are drawn from other assertions. What the nature of this "drawing" may be it is the whole business of the logic of inference to determine. It cannot be settled beforehand by a plausible and question-begging phrase.

6. Inference and imagination are alike in involving the suggestion of a "new" content. It remains to point out when they differ. Broadly, as already mentioned, and as everybody knows, the difference is that inference carries with it *belief*. In imagining we merely suggest; when we infer we believe with more or less of intensity. The question of belief is vital to inference, as can best be seen if we consider, not the actual beliefs resulting, which are sometimes weak enough, but the *intention* of inference, which is always to end in the assertion of truth—to which imagination, on its side, is wholly indifferent.¹

As to the nature of belief, we have adopted Hume's account with a difference. Belief differs from a mere idea simply in liveliness or vividness, not in content. An idea is the content of a more or less inexplicit suggestion. Make the suggestion explicit, and it is a statement of what may be. Put it in a mental attitude of expectancy, i.e. with reference to possible further knowledge, and it is a question. Make it with conviction and assurance, and it is a dogmatic assertion. The main difference is the degree of force with which the content is asserted, which varies from the maximum of certainty to the minimum of tentativeness. This is in effect Hume's account, only turned upside down. Hume assimilates all belief to ideas. We assimilate ideas to assertions.

Belief being confident assertion, what are its conditions? Taking this as a generic question, it has already in great part been answered. Confident assertions of the present are acts of apprehension or analysis; these rest in the main, as far as we can see, on a physical stimulus, whether central or peripheral in origin. So does memory, which has in part the same conditions as associative suggestion, though differing in its relation to apprehension. But there is this difference, which marks off inference from all other forms of assertion, that in its case the mind which infers can specify the grounds on which its belief

¹ There is, indeed, in a higher sense, a truth of imagination. But when that comes into view we have already left mere imagination behind us, and are on our way to use the free play of our constructive powers to make clear to ourselves truths of a higher or subtler kind, which we divine, but cannot wholly grasp.

rests, can lay down the conditions upon which it holds the conclusion to be true. All the other forms of assertion have their conditions; they are mental events, and have causes like other events. But if we know these causes at all, we know them only by inference, and it is not essential to apprehension and the rest that they should be known. In the case of inference, though we do not know all the conditions which make us assert, we assign some of them, and this assignment is essential to the act of inference in its full development. We assign, for instance, certain similar experiences in the past, and we protest that but for these experiences our present belief would not hold. Here then is assigned, not the totality of psychological conditions, from which the present assertion proceeds, but the logical condition which we (when we infer) believe to be the all-important thing—so much so that it matters little to us by what machinery we are enabled to make new assertions. We are content with this, that given the remembrance, the fresh assertion follows. And this remembrance we admit to be a *sine qua non*.

Not all inferences, it must be admitted, have this character fully developed. There are "telescoped" inferences, and the inferences mechanically produced by association. When I "have an idea" that there will be a storm, or that we shall lose, very likely I cannot tell why I have it,—probably because it is suggested by some subtle association which I cannot analyse. In the first of these cases a single judgment gives what might be resolved into premisses and conclusion. In the second, the premisses are dropped altogether,—perhaps have never definitely been asserted as such,—and the conclusion alone is held fast. But such processes, if they are to be justified, have to fall back on conscious inferences—inferences, that is, in which the mind definitely and expressly asserts the conclusion on the strength of the premisses, linking them by a "because" or a "therefore." In all these cases, and in these alone, the mind is directly aware of the conditions of its own assertions. It asserts, knowing why it asserts.

It follows from this that the conditions of inference are subject to examination, comparison, and test. Inferences are sometimes false and sometimes true, just as a memory-judgment is sometimes false and sometimes true. But in the case of memory the conditions are not accessible to ordinary consciousness. If we want to improve our memories, or to know what kind of memory may be relied on, we must go to a psychologist; and even then a sceptic may be excused if he

doubts whether we are much better off than before. This is simply because memory as a ground of belief is ultimate. It does not rest on, is not composed of, does not follow upon, any other fact of which the mind is directly aware—excepting, of course, the apprehension, which it is its own business to assert;¹ and it cannot, like inference, assign the apprehension as its proof, for that would be to reason in a circle. In inference, on the contrary, the conditions are certain definite assertions made at the time of inferring, and separable from the conclusion. Now, if inference plays us false, we can know the reason why. The fault is in the premisses. Either they are untrue or they are inadequate to prove the conclusion. On what grounds we decide between these alternatives we do not at present inquire, but we shall take it as a fact that in many cases we remain convinced of the truth of the premisses and the falsity of the conclusion. If that were not so, we should never have heard the words "fallacious" or "unreasonable," nor, again, should we know what a "valid" argument or "sound" proof meant. The conception of validity must be analysed at a later stage. For the present, let us be content to insist upon the fact of the conception and its importance in the real life of thought. We frequently correct our tendencies to draw "hasty" conclusions, and by such correction intellectual education advances. To a great extent, no doubt, the correction is unconscious. A careful experimentalist acquires a kind of tact which makes him clear as to what an experiment will prove. And in the main he owes this, not to text-books of logic, but to the practice of the laboratory. He learns by experience what kind of experiments are safe, just as a rhetorician learns what kind of arguments persuade. On a larger scale, though in a less degree, all of us learn in ordinary life what kind of inferences are good. We may know nothing of Barbara, or the method of Concomitant Variations, but we know a good argument when we hear it. An undistributed middle does not escape us, and though we do not call it a *Quaternio terminorum* we denounce it as outrageous sophistry. A generalisation from a single instance begins, as we grow to manhood, to strike us as hasty; we learn that one swallow does not make a summer, though we have never heard simple enumeration denounced as *res puerilis*. We understand the *variatio inquisitionis pro natura subjecti*, for we see that

¹ Memory may to a certain extent be tested by memory apart from inference, as we shall subsequently see. In a small degree we may learn to select memories for true or false, according to certain characteristics with which they are given. But in the main the contrast with inference holds.

the sort of line that you may take in archaeology does not hold in mechanics. In all these ways practice in inference has made perfect, at least it has made us less imperfect. Modes of inference which do not give truth are rejected consciously and once for all, or unconsciously and little by little. The mind selects the valid methods and rejects the rest.

The logic of inference, as I understand it, has for its main object to formulate the valid methods of reasoning, and to inquire, if the inquiry be possible, why they are valid, and how we can know them to be such. We arrive here at the central question of knowledge,—a question which is merely blinked when we are told that it matters not why,—we do, in fact, infer in such and such ways for such and such reasons. Of course we do, and very often foolishly enough. But the question is, what are the good inferences, what are their general characteristics, or, if these cannot be laid down, at least to what type do they approximate? We may be told that to enter on this inquiry is to resuscitate the vain attempt to lay down criteria of correct reasoning. The practical man knows how to reason, and he does not come to the logician for advice; nor has any logical theory ever advanced scientific practice. Much of this is true, and logic in its present position has to learn from science, not to teach. The criteria of truth will be apprehended more clearly by the *αἰσθητής* of the expert, so marked is the individuality of all truth and all existence. Our object, then, is not at present to formulate criteria for practical guidance, but to infer criteria from practical usage. The theory of knowledge has a practical utility, perhaps, all things considered, as high a practical utility, and as great a practical influence on human affairs, as any other single inquiry. But its utility is not that of a teacher of method, and it is an error to apply it to that end as long as it remains so incomplete in itself. All that we postulate, then, is that there are good and bad inferences, that some methods of reasoning succeed while others fail. This much I take to be fact, matter of observation. Beyond this we anticipate that there is some reason for success or failure, some common character in good inferences distinguishing them from bad. Whether this is so or not, the success or failure of the actual investigation alone can show. It would be absurd to deny it *a priori*. It would perhaps be rash to affirm it. But it is consistent with reason, I suppose, to suggest as a hypothesis that such a character exists, and to proceed with an attempt to reach it by comparison and analysis.

To sum up, the central fact of inference is its use of a

datum as the ground from which some further content flows as consequence. In fully developed explicit inference the datum is distinguished as premiss from the consequence as conclusion. The use of data as conditions enables inference to assert "new facts," i.e. facts not in any strict sense contained in the premisses. But "newness" of this kind is not essential to an inferential conclusion. Strictly "new" assertions involve the same application of ideal contents to fresh cases which we found in imagination. But inference differs from imagination as confident assertion from mere suggestion, and its confidence rests, first, on the *truth* of the premisses and, secondly, on their adequacy to prove the conclusion. If they are adequate the inference is good; if otherwise, it is bad. And in this "goodness" or "badness" of inference the conception of validity is involved. Consciously or unconsciously, the mind learns to adopt good methods and reject the bad; and it is the object of logic to discover the general characteristics which it presumes to be common to those methods which are good.

CHAPTER IV

THE IMPLICATIONS OF INFERENCE

1. As we distinguished the forms of judgments which do not involve inference by the relation of their contents to the apprehension on which they are based, so we may classify inferences by the relation of conclusion to premiss. Every inference must assert a "new" fact; that is to say, one in some way distinguishable from the premisses. The different relations between premiss and conclusion will thus give us the different types of inference, and after educing these we shall have to see whether any common principle can be found running through them all, or whether there is some other way of connecting them.

A preliminary word seems necessary on the method by which the relation in question is to be determined. When one proposes to infer, that is, to base one assertion on another or others, two main cases seem possible. First, the premiss or premisses may be *equivalent* to the conclusion. And by this equivalence we must mean something very definite. It is not to be taken merely as another expression for the relation of ground and consequence. It must not imply any further truth beyond that asserted in the premisses themselves. Such a relation is indeed often meant when we say that two propositions are equivalent. "The second reading was only carried by 3—that is *as much as to say* that the measure will be dropped." Yes, on the assumption of certain rules or practices governing parliamentary procedure. This is the loose use of equivalence, when it means really *necessary connection through some well-known truth* too obvious to be stated. It is clear that in this sense every valid argument lays down a conclusion which is equivalent and no more than equivalent to its premisses. But in all these cases something further than the premisses is really assumed. In the strict meaning of equivalence *nothing* further is

assumed.¹ If the premisses have any meaning at all, to deny the conclusion directly contradicts them. Two assertions A and B are equivalent when to assert A and deny B is a direct contradiction. Two assertions A and B are together equivalent to a third C, when to assert both A and B and to deny C is a contradiction. This is the first case possible, the first kind of relation to be considered between a set of assertions of which one is or professes to be based on the rest. And the question in this case will be, have we inference proper at all, or have we mere repetition or tautology?

Secondly, premisses and conclusion, taken as they stand, may make assertions which are not in the strict sense equivalent. The second assertion here professes to follow from the first; it claims to be necessitated by the first; but to assert the premisses and deny the conclusion is not, as the statements stand, a direct contradiction. It is not meaningless. "War is declared, and the price of wheat will rise," is probably a good inference; but taking the two statements *as they stand* you can assert the first and deny the second without contradiction. "War is declared, and wheat will fall," remains a perfectly intelligible conjunction of statements.

Now in this case there is no doubt that the conclusion asserts a new fact, and the difficulty is just the converse of the previous one. The new fact is here so new that we have to ask why it follows at all. And one way at least seems possible by which we can get an answer to this question. Suppose we can find some further judgment which will connect premiss and conclusion for us. Suppose, that is to say, a judgment, such that when combined with the premiss it is actually equivalent to the conclusion in the strict sense above defined. And suppose, lastly, that this judgment is true. Then clearly our inference will be justified. Conversely, if our inference is valid, and if a judgment *x* is found which connects premiss and conclusion in the sense defined, and *if, further, the rejection of x would similarly involve the denial of the connection claimed between conclusion and premiss*, then *x* must be regarded as implied by the inference. Unless an inference can specify such a judgment as supporting it, it cannot make its method explicit at all, and to make it explicit is our business. And we may point out that while any inference, good or bad, may find for itself the judgment which it implies, the difference will be

¹ Cf. Aristotle's criterion of syllogistic necessity, *ἀλλὰ δὲ ἐὰν ταῦτα ὅτις ἐδὲ διὰ ταῦτα συμπαίῃται, καὶ διὰ ταῦτα συμπαίῃται καὶ παρὸν ἵκανὸν ὅπου ἀποδείξαι ἀπὸ τοῦ ὑποκείμενου καὶ ἀναγκαῖον*.

precisely that in bad inferences this judgment will be false, and in good inferences it will be true of reality. Whether we are aware of it or not, if the inference is sound *x* must be true, and in claiming to make the inference we commit ourselves logically to the assertion of *x*.

Our method then will be to take various forms of inference and to ask first of each whether in it the premisses are "equivalent" to the conclusion. If so, we shall have to ask further whether they are *bond fide* inferences. If not, we shall ask what judgment can be found which will combine with the premisses so as to make them equivalent to the conclusion.¹

2. The simplest case of inference from our present point of view is that in which we have one premiss and a conclusion, the contents of each being unequivocally different. "The clouds are gathering, then it will rain." "I knew he was a Cornishman (conclusion) by his accent" (premiss). "That is the face (premiss—probably an imperfectly analysed perceived quality) of an obstinate man" (conclusion). All these, of which it is needless to multiply examples, are inferences which may be expressed in one judgment or more, but all of which clearly admit of being resolved in their first analysis into two judgments, a minor premiss and a conclusion, of the form—

Here is A,

Then there will be B;

or more definitely in the form which we may provisionally adopt²—

This is A,

Then it is B.

Now, in very many instances the first analysis is also, so far as any conscious mental process is concerned, the last analysis, and the ultimate account of the matter. That is to say, you may make a man aware that he first recognised A and then asserted B, or, at any rate, that his knowledge of A was due to direct perception, while that of B was a further

¹ Note that a judgment *x* may be so related to an inference that if it is true the inference holds, but that if it is false the inference is not necessarily invalid. In this case *x* could not be taken as implied by the inference. We shall assume provisionally that, where we can only find one judgment which will "explain" an inference, that judgment is also implied by it, making good our assumption when necessary. (See Pt. III. Chap. II.)

² The only objection to such a form would be that the conclusion is not always concerned with the same object as the premiss. There is, however, I think invariably, some continuity, and it is only necessary to understand the "this" as being applicable loosely to any kind of continuous or connected existence—e.g. in the inference from clouds to rain the continuous element is the weather at the time.

assertion; but you will not probably get him to admit any further mental state as concerned in the matter. Inference as a change taking place within the mind is frequently neither more nor less than a passage from minor to conclusion. Sometimes, as we have seen, it is less—it is merely the conclusion, or it is a judgment in which premiss and conclusion are inextricably intermingled; and sometimes, as we shall see, it is more, but often it is precisely this transition from one judgment about the thing or the circumstances to another.

So much for the conscious process. If, however, we ask, not what is passing in the thinker's mind, but *what must be true if the conclusion is warranted*, we shall get a different result. First let us understand the question. We do not ask what must be true if the conclusion is *true*, for you may get a true conclusion from false premisses; but what must be true if the conclusion is *warranted*, that is, what are the conditions from which the truth of the conclusion *may be known* to follow from the premisses. When, in future, we speak of the conditions or real premisses of inference we shall always mean these conditions, and not the state of consciousness actually preceding the conclusion in any chance thinker's mind.

In this sense it will be clear that the minor can never be the whole premiss, and a further judgment is required to connect it with the conclusion. Where can we find such a judgment? The first and obvious answer is "in previous experience of A in relation to B." "He is a fool," says Mrs. Poyser, "who can see the cat go into the dairy and ask what she has gone there for." "The village matron," says Mill, "prescribes for her neighbour's child on the strength of what is good for her Lucy." Now what, briefly, are the facts which the village matron had before her? and in stating these let us confine ourselves at first to what can be called her knowledge, as distinct from any extension of, or inference from, that knowledge. This, in accordance with Mill's doctrine, and in pursuance of the doctrine of the preceding paragraphs, may be put—

My child, with such an ailment, was cured by such a drug.

Here is a child with similar ailment;

It can be cured by similar drug.

That is, starting from the fact given in the present, an ailing child, we can recall a similar fact (another ailing child) conjoined with a further fact (cure by a drug). These are the premisses. The conclusion asserts of the present a content similar to the "further" fact of the past. Symbolising we have—

$A_1 - B_1$ observed in past
 A_2 observed now
 - B_2 asserted of A_2

The points to be noted are that A_2 must be given as similar to the A_1 observed, and that B_2 , which is asserted, must be similar to B_1 , and the relation between A_2 and B_2 similar to that between A_1 and B_1 . In this form of inference, then, if for convenience' sake we regard $A_1 - B_1$ as forming one whole fact of observation, we may say that given a fact similar to a part of a known whole, we assert it to form part of a similar whole.

But merely to specify a similar observed fact is not enough to justify a conclusion; if it were, we should never hear of a hasty generalisation. Something further is needed which we have now to determine. The most obvious suggestion is to increase the number of our observations. One case of $A - B$ may not count for much, but a dozen cases, a hundred, a thousand? No doubt there is some safety in numbers; but where exactly are we to draw the line? If all the men I have ever interrogated can read and write, is it safe to infer of any "fresh" man that he can do the same? Obviously that depends on two or three things. To begin with, it depends on the kind of similarity between him and others. If he has a white face and wears a frock coat the inference is fairly safe. If he has a brown skin and wears a waist cloth it is risky. Again, it depends on the kind of connection between "man" and "read and write"—a subject on which we shall have more to say later. Obviously, mere repetition of instances as such does not guarantee the conclusion. If we require the conditions from which the truth of the inference may be known to follow, we must look elsewhere.

Return, then, for a moment to the original premiss. "This is A, then it will be B." If you are cross-examining a person who draws such an inference, the obvious thing to ask is, "Do you mean that any A will be B?" i.e. are you inferring B from A as such? "'You think *laissez-faire* best in this case—do you think it *always* the best thing?' The implication is that, if not, you must be prepared to adduce that circumstance in the case which makes *laissez-faire* the true policy here; and this circumstance must be one which always makes it the best policy, unless, again, to take a further complication, there are special circumstances which always make in the opposite direction."¹ Without pursuing these complications further, it is pretty clear that in arguing from A to B in *this case*

¹ From an article by the author in *Mind*, No. 61, p. 82.

we commit ourselves to the assertion—Any $A - B$ or All $A - B$.¹

Thus in the actual practice of thought the universal is taken as implied by the argument from minor to conclusion. We shall come in later chapters to direct theoretical justification of this. We have now to observe that if we assume the universal it will be sufficient to "explain" our inference. For this, we saw, would be done by any judgment, which together with the premisses should be *equivalent* to the conclusion. Now the conclusion is $A_2 - B_1$; and the given premiss is A_1 alone. What judgment must be added to A_1 to make a whole equivalent to the assertion of $A_2 - B_1$? The judgment All A is B seems to satisfy this condition. Given "All $A - B$ and this A_1 ," and we have a pair of judgments which, combined, are equivalent to the judgment, "This is B_1 ."² Assuming the general judgment we thus explain the conclusion, and we may say, at least, that it is a good hypothesis that the truth of the general judgment is necessary to the soundness of the conclusion. Clearly this cannot be suggested of the particular observations, however many they may be. $A_1 - B_1, A_2 - B_1, A_3 - B_1, \dots$ add as many of these as you please together and they come to this: "All *hitherto observed* cases of A are cases of $A - B$. This is a fresh case of A ." Add these judgments together and they do not amount to "this is B " unless you also add to them a third judgment, "What is true of certain cases is true of any other," and this makes your premiss into an universal judgment.

It is pointless to reply that this judgment is not present to the thinker's mind when he reasons. The question for us is not what passes in any individual's mind, but what are the conditions from which the conclusion may be reasonably inferred. These conditions the individual must know if he is able logically to support his conclusion. Very often he is not able to do this; he infers, but can give you a very poor account of the grounds of his inference. He may, even so, infer well, in which case he is a person of insight, tact, skill, wisdom, but not a reasoner, nor one who understands the logical connection of things. The practical mark of such a person is the irregularity of his success in inference. He reasons well when he has great experience or some natural gift,

¹ That is, if we stick to A as the ground of B . As pointed out, the alternative is to substitute some other relation $\alpha - \beta$; but the point is that the relation finally adopted must be universal.

² The α , it must be recollected, does not symbolise any qualitative difference, but merely that the B asserted is the particular B belonging to this particular A .

but apart from that he flounders. A logical mind is slower but surer. Admitting, then, the difference between different minds and between the same mind in different cases, let us also be clear that the difference is immaterial to our purpose. In fact, the above argument proves a good deal too much. If the universal is unnecessary, because, as a matter of fact, many people reason without it, the past observations are equally unnecessary, for, from this point of view, many people reason without them. Many people, all of us on occasion, reason (so far as the conscious process is concerned) from minor to conclusion; we are absolutely forgetful for the time being of any past observation bearing on the case. Very often we cannot, even on cross-examination, find any such observation to specify. But, you may say, there must have been such an observation, or the inference would not now be made. Yes, say we, and by similar reasoning there must be some knowledge of a universal truth, or the inference cannot be sustained.

I conclude that in the inference from minor to conclusion, or from one particular to another, the universal judgment is implied if not explicitly asserted. And, granting this implication, the inference is justified. Thus from the logical point of view the argument from particulars resolves itself into the two inferences of the old-fashioned logic, from particular to universal, and from universal to particular. We have therefore to consider these forms, and ask whether they are exhaustive of the types of inference.¹

¹ The difference between our view and Mill's is, after all, mainly one of emphasis. Mill was aware that the universal is necessarily implied in inference (*Logic*, ii. chap. iii. § 3, pp. 214 and 220, § 4, pp. 223 and 225, 10th ed.), but concentrating attention on premisses and conclusion, he saw that these were ultimately particulars. We attend rather to the inferential *process*, and find its very essence to consist in the treatment of the particular as a case of the universal.

CHAPTER V

GENERALISATION

1. First, what is an universal judgment? What does it assert? The qualitative and other judgments with which so far we have mainly had to deal, characterise the contents of definite acts of apprehension or memory. But we have already noticed one judgment which begins to emancipate itself from the apprehended order. The collective judgment is a construction of a special kind. It does not assert anything outside the reality which has been apprehended, but it combines the content of several acts of apprehension, and asserts them in one single thought. And, in doing this, it is not confined by any easily assignable limitation. In memory-synthesis—another form of construction—we simply review that which has been given continuously. There is an assignable reason—given continuity between the parts—for reviewing the whole of the series at once. In the collective judgment the reasons for making the collection are more various. Generally the resemblance, and sometimes the contrast or marked difference of the contents “collected,” appears to be the bond of union. Sometimes it appears more arbitrary; but, in any case, individuals may be collected together in the subject of the judgment without the slightest reference to the order in which they have been apprehended. The only limitation we have hitherto had is that they must all of them have been given. But we may note a further distinction among these collective judgments of the given. The individuals referred to may be definite in number or indefinite. In “Both my oranges were bad,” we have a collective assertion of the results of two separate investigations. The order of these investigations is immaterial, but the reference is quite definite; that is to say, both the elements of the collective whole form matter of definite memory; what the whole includes is definitely stated; in

short, the judgment is neither more nor less than the summing up of two memory-judgments.

But the collective judgment, even when a pure construction of memories, is not always so definite. I may be sure that it has rained every day since I have been here, without being able to specify the number of days, and without being able to recall them as distinct from one another. My collective memory is no longer a summing up of certain definite particulars, each with its own clearly marked position in the series of given facts. Again, "Every man in the crowd had a blue ribbon," does not seriously imply a distinct recollection of each individual, still less a knowledge of the number referred to. "He has always voted straight,"—a judgment which presumably rests on a record,—states, not where or when or how often he has voted, but a certain fact about his vote, no matter when. Thus, within the limits of the collective judgment, based on pure memory, we pass from a combination of very definite assertions to a judgment about facts indefinite in their number and position, but existing somewhere in the memory series, and of all of which some characteristic is asserted to hold. The subject of this judgment is therefore indefinite as to number and position, excepting only that, if it really depends on memory, the facts composing the subject must have been given.

Now, in dealing with imagination, we have already seen that the mind transcends the limits of the memory series. We have postulated, namely, that we can apply ideal contents in fresh contexts, and so suggest or assert contents never given. The barest form of such suggestion is the extension of space and time beyond the confines of the given, with the resulting conception of an indefinitely wide reality. This wider space and time we may imaginatively fill at any point; and, lastly, such a suggestion or affirmation about the "unknown"¹ may be collective, just as memory may be collective. We may, in one act, affirm what might equally be contained in many assertions, and what (if the affirmation be justified) will probably form the content of many acts of apprehension for one subject or another. The subject of such a judgment,—such a collective prediction,—then, is indefinite as before, with this further degree of indefiniteness, that it may exist in the future as well as in the past. Every general idea, indeed, is suggested of reality in this fashion. But the universal judgment does not merely suggest a content as existing in a

¹ Using the term merely as a compendious expression for anything which has not entered into our personal experience.

multitude of cases—undefined as to nature and position—in reality. It also, like the collective judgment of memory, asserts something of these contents whenever and wherever they exist. The predicate is asserted of all cases of the subject, and so far the universal judgment is definite; the position of the predicate is *pro tanto* defined. Extend the "all" of an ordinary collective judgment to include not only remembered but suggested cases, all the cases possible in reality; assert the predicate of the suggested crowd just as before you asserted it of the definitely, and then of the vaguely remembered crowd, and you have the universal judgment. This judgment then = the collective judgment of memory + an imagined reference beyond the memory series. It is true that the last element of meaning on which strict universality depends is not clearly explicit in the judgment form; and so far the collective judgment mimics the universal. The well-tried servant of logic, "All men are mortal," may, as we all know, mean "all men I have seen or heard of." Then it is a true collective judgment of memory. It may also mean, "All men that have been, are, and may be." Then it is a true universal judgment, asserting a predicate of all the individuals that have existed, or may be suggested to exist in reality.

2. It is important for logic that the element of definiteness in the universal judgment should be constantly borne in mind. This element is the relation asserted between subject and predicate, and broadly we may say that it appears in the universal judgment, and not in what is sometimes called the universal, but which should on this account be called the general idea. To entertain a general idea is to suggest a content of reality in an indefinite number of cases, but does not also assert something of that content in all those cases. Yes, it may be said, it asserts the identity of the content in different surroundings. But this is nugatory. The general content is an expression for a certain common character of many individuals. To say, then, of such a content, that in all instances it has a common character is mere tautology. So soon, indeed, as the content is of a complex character involving relations (*e.g.*, of some $A - B$ instead of mere A), the idea may be taken as a covert suggestion that the relation $A - B$ is universal. But if that is meant, it should be explicitly stated. There is all the difference in the world between the judgment "An indefinite number of cases of $A - B$ exist" and "The relation $A - B$ is universal." In the first case, we may also have $A - C$, $A - D$, $A - N$. In the second, we may have none of those, but always $A - B$, and nothing but $A - B$. Now, a general idea, whether its content be simple or

complex, never distinguishes between these meanings, and is thus purely indefinite. "Feeling" or "thought" suggests a content found in reality, without specifying when, or where, or under what condition. But "Feeling is the inseparable accompaniment of such and such a molecular modification of the cortex" asserts that feeling is always, and in any case, found in a definite relation. "Three-sided figures, with angles together equal to two right angles," is put indefinitely, and does not say whether the two sides of the content are separable or not. It is a general content. "All three-sided figures have angles equal to two right angles" is put definitely, and says that the subject and predicate are inseparable. It is an universal judgment.¹ Now, in all inferences, it is the universal judgment, not merely the general idea, that is implied. Inference is about relations. It asserts a content to be related to a given content, and to do this it must know not merely that similar contents exist, but that similar *relations* are always found between them.

3. Like other judgments, the universal is asserted with a certain feeling of belief. Every assertion we have seen is psychologically differentiated by the degree in which it is characterised by this feeling, which may vary in intensity from zero to a maximum. The feeling has also, I should suppose, its own characteristic shade of difference, according to the nature of the content asserted; and, in the case of the universal judgment, it seems to have been correctly described by Hume as a feeling of the necessary connection between subject and predicate, or, as we may put it, between these ideas.² There is this peculiarity about the universal judgment, that it is often modified in statement in such a way as to make this felt tension the actual purport of the assertion. Thus when we say, "A is bound to be B"; "An overbalance of

¹ Antitheses are always misleading, though they are often necessary, and the text might be taken as reserving the opposition of idea to judgment. But this would be a misunderstanding. The opposition before us is purely one of content. To make this clear, we put it thus. Certain acts of thought suggest contents, simple or complex as existing in an infinite number of cases in reality. Others assert that the elements of certain complex contents are always found together in reality, and never apart. The first class correspond to what are often called general ideas, the second to universal judgments. Strictly, both are either assertion or suggestion, and we may put them in judgment form. "Social democracy is a possibility," suggests a general content. "Political democracy, supervening on a capitalist system of industry, and unshaken by the presence of militarism, inevitably develops into social democracy," is a universal judgment, true or false. It is partly indefinite or suggestive, viz. as to the conditions it lays down, partly definite and categorical, viz. as to the consequent which follows from them. Whether in the form of judgment or of idea (i.e. merely suggested reference) the contents must be distinguished as "general" and "universal" respectively.

² The feeling is no doubt what Prof. James has well called a "fringe."

force in any direction must necessarily produce motion"; "Of course, the triangle is half the parallelogram"; "Because"; "Therefore,"—in all these cases the tension appears as the direct content of the judgment: and we are close to the ethical judgment, "You must," "I ought," which seems similarly to express, in the first instance, a felt necessity of acting, an actual feeling qualifying the idea of an act, or (if you prefer it) qualifying the relation of the idea to will. This tension between one assertion and another seems to exist as a psychical force even where it is not felt. Thus we may suppose that it causes the transition from minor to conclusion, but is not felt unless the two judgments coalesce and form subject and predicate of the same judgment. In such case the feeling will be present, but it would seem to be only in certain forms of the universal judgment that it enters into the content asserted.

Even here it cannot be said to be the whole explicit purport of the judgment. Granting a felt tension between its elements as existing in my thought, I do not ordinarily mean to assert that tension as a relation of my thought only. I should not assert it in the form of the universal judgment, unless I believed something else as well. This something else is the "objective" connection of the elements as such, and it is on this imputed connection that the felt tension of the contents as elements in my thought is supposed to be based. Directly and explicitly, then, it is a "real" necessary connection which the judgment asserts. Thought would directly contradict its own claim to be valid if it said or implied, "The idea of A forces me irresistibly on to the construction of the whole A - B, though between A and B in reality there is no connection." On the contrary, wherever thought recognises such a situation, as *e.g.* where it is aware of having been under the spell of some illusory association, it rejects the result and disentangles itself from the contradiction. It refuses to continue the connection as soon as it sees that it does not belong to the contents as such. Were any connection, not attributable to the contents connected, nevertheless irresistible for thought, we should have a final and irreconcilable contradiction.

4. The universal judgment, then, attributes connection to its elements. Certain elements-in-connection form its content. "Within wide limits¹ the volume of a gas is inversely as the pressure"; "The molecules of a solid oscillate about their

¹ Such a qualification does not detract from the "universal" character of the judgment, if (a) the limits can be defined, or (b) a law of concomitant variation lay and the limits can be found, or (c) the differentiating conditions which make the relation good within the limits can be assigned.

centres of gravity." "Injury to the Rolandic region is accompanied by motor paralysis,"—all in their different ways state real connections. But what is a real connection? When I say the sky is blue, that states a "real" fact, in the sense that it is something that I apprehend. "The square on the hypotenuse = the sum of the squares on the sides" states a relation which I may not in this case apprehend directly, but which is like an apprehended relation, and hence is real. But what sort of a reality is a real connection? Where, among given facts, is necessity to be found? A real connection, we may say, is a necessary relation. But a relation as such is of course not necessary; if it were, all knowledge and all reality would be revealed to us by mere contemplation of the given. What, then, is the qualification introduced into a relation when we allege it to be necessary? What, at least, do we mean by the word, whether we have or have not any right to our meaning?

The answer to this question is not wholly to be found in the analysis of the universal judgment. With that judgment the question first comes up, but its whole solution, or rather, the meagre whole which any treatise on logic can contribute to the solution, can only be given as the result, not as the condition, of the whole theory of inference. But this much may be said on a first analysis (the analysis made sceptically by Hume, more constructively and adequately by Mill); the conception of necessity involves that of universality. When I say that A and B are necessarily connected, I mean something. What is that something? Is it that A and B are related in this and that instance? Yes, it is that; but more than that. Is it some peculiar kind of relation that exists between them? Certainly, it is not a relation in the abstract, it is this particular relation which I have found by analysis. But then, does it merely assert them in that particular relation? No, it says that the relation is necessary. Then, is this necessity a special feature to be detected in the relation by further analysis? That is not clear; at any rate, in a given case, we are at a loss to lay our hand on it. Then what, that is definite and certain, do we mean? Not merely a given relation in a given case, not perhaps a given relation of a given character, but a relation that holds between the contents A and B *as such*. A *as such* stands in a given relation to B. It is related in this case or in that to C and D, but in both cases the relation involves other facts. Here alone we have, *e.g.*, B depending on A, and A only. B is true of A *as such*. But what does this "*as such*" mean? When we speak of it as expressing the dependence of one term on another, as meaning that one term "*involves*"

another, is the condition from which another follows as result, we may be quite justified, but we have not moved a step towards the analysis of necessity. We have phrased it differently, and that is all. This only can we say, that where B belongs to A as such it will be related to it universally, in all cases. If B is related to A as such, then, any and every B will be similarly related to A. Here, at last, we have a differentia. It is not any peculiar characteristic of the relation $A - B$, but the belief that that relation will be found in all cases which gives the point to our assertion of necessary connection. And here it is obvious that we have come round to the point from which we started. The universal judgment was held to assert necessary connection, and we have now analysed necessary connection into universality.

Without assuming too hastily that our analysis is complete, we may put our results somehow after this fashion. Necessary connection involves universal relation, whether it means something more or not. Conversely, a strictly universal relation is not asserted unless the subject is regarded as a sufficient basis for belief in the predicate, and this logically involves, not a merely subjective development of an idea, but a real relation which we can only describe as a necessary connection. We must not allow necessity to be an illusion, even if we can do nothing but resolve it back into universality.

The universal judgment, then, may be put in three forms:—

- (1.) All A is B, or any A is B.
- (2.) A as such is a sufficient ground for asserting B.
- (3.) $A - B$ forms a necessarily connected whole.

Any one of these forms strictly taken implies the other, though one form may (and perhaps with reason) seem more appropriate to one content and another to another. Thus we say, "In all vertebrates the nervous system has some kind of centre"; "The united testimony of contemporary historians compels assent"; "Elliptical motion is the necessary result of the combined influence of gravity and inertia." But in each case we remain able to pass from one form to the other, and which we start with or arrive at is indifferent.

5. Closely connected with the universal, especially in its second and third forms, is the hypothetical judgment, with which, indeed, some writers have identified it. If this identification meant merely to insist that in the universal the terms are related as ground and consequent, and that this relation is best expressed in the hypothetical form, no objection could be made. But a confusion is possible and must be avoided. The hypothetical judgment (if A then B) supposes a case, and

thereupon affirms a consequence. The whole content, antecedent and consequent, taken as a whole, is still a mere supposal, but the assertion is that the existence of one element involves that of the other. Supposal, then, is a form of suggestion made for a purpose, viz. of seeing what comes of it; and it can work only in an area where universal judgments are known. Its simplest and most straightforward use is the application in thought of some universal relation to a particular case. "If you run you will catch the train" applies a content tentatively to your case, and gives you the result in accordance with certain universal relations of time, space, and the speed of human legs. The possibility of a supposal of which anything is to come rests, therefore, on the not merely supposed but categorically asserted universal relation. The hypothetical judgment proper supposes the universal.

Now, in a certain sense, supposal or suggestion plays a part in the universal itself, particularly in its first form. In "All planets move in ellipses" we have noticed a certain indefiniteness affecting the extent of the subject. The proposition is intended to hold, not only of all observed planets, but of others *if there are any*. But are there any? This can only be—at least, so far as this judgment is concerned—a matter of suggestion or supposal. Here, then, is the rub. The judgment, it seems after all, asserts its predicate of a supposed subject, and is therefore hypothetical. This reasoning simply turns a plus quantity into a minus. The judgment asserts its predicate categorically of certain facts, and of any others, if there are any, i.e. hypothetically. To add the suggestion does not take away the assertion. The content asserted is found in reality; when, where, or how often, is not specified; but it is found: it is found, and will be found always as a whole, and its elements will not fall asunder. In all this the judgment is categorical. Because we recognise that the relation may exist in cases yet unknown, we do not necessarily deny that we know of cases in which it exists. But this is the logic which would reduce the universal to the rank of a supposition.

But it may be said, the universal form does not, in fact, imply the existence of the subject within the area of observation. "The path of a projectile is a parabola," although there are, in fact, no projectiles that move in perfect parabolas. Here, then, the universal judgment connects contents which do not exist; and if it does this once, it may, so far as its form is concerned, do so always. Now we may admit that universals of this kind, though we allow ourselves the licence of a categorical form of expression, are, in content, true hypotheticals.

But we must make two objections to the conclusion drawn from this. For (1) though the judgment is hypothetical, it is practically a compendious form of stating certain categorical results, viz. that the path of a projectile approximates to a parabola, in proportion as the forces acting on it are reduced to two; and (2) the form of a judgment never is a sufficient key to its meaning.¹ Outside logical text-books every judgment stands in certain real relations which modify its meaning, and it is the worst and most cristic kind of formal logic which determines the meaning of the judgment from its bare form in the unreal isolation of an "example," when such meaning conflicts with the clear intention of the judgment in concrete thought. Universal judgments, as they are meant, constantly imply the existence of the subject matter.² Indeed, I should take the normal content of an universal judgment to be that $A - B$ is found in reality an indefinite number of times while its elements are never found apart. But that is not all. If some universals are, as they stand, hypothetical, they must always imply a really known connection. It is only from known connections of content that supposed connections can be inferred. The perfectly parabolic motion is an inference from real motions in real combinations. The supposed connection that is not founded on a real one and a known one can only be fruitful in fairyland. And this overthrows another suggestion, viz. that the necessary connection asserted depends on a reality outside the contents connected. "Trespassers will be prosecuted" means not that there are trespassers or prosecutors, but that there are landlords, and law courts, and legal rights and means of redress. Here, again, an extreme case has been accentuated and the important point overlooked. Unreal but true suppositions certainly do assert an "outside" reality as their true basis, but what they imply is that that basis is known and its consequences observable in a parallel case. We have, if α then β ,—an unreal supposition which in fact affirms the reality C . But that C , qualified and acted on by α , would give us β , could not possibly be known if we did not observe C acted on by α and giving β , i.e. if we did not know real connections of content into which C enters. In every case, then, the hypothetical judgment presupposes the categorical universal.

¹ In an example like Sigwart's (*Logik*, I. p. 293), "Der brave Mann denkt an sich selbst zuletzt," the form is especially adapted for leaving doubtful the reference to reality. But take even this judgment, and compare it with "The perfect stone is either more or less than a man," and surely the intention is different. There are brave men, and there are no perfect stones. The object of reference, accordingly, seems to be necessarily different.

² This is allowed by Mr. Bosanquet (*Essentials of Logic*, Lect. vii. p. 120).

It may be urged (I add only one word on this point) that at least the "All" form should be given up. Where the all is admitted to be indefinite, and to contain an element of suggestion, its function is as well performed by the "as such" judgment. But this I think an error. One feature of the universal which recent logic has tended to slur over is its applicability to numerically distinct instances. This feature has an importance of its own, and accentuates certain assumptions of thought more clearly than any other. And it is only in the avowed reference to all instances that may exist that we get this feature and the assumption underlying it avowedly recognised.

I conclude, then, that the universal judgment may be taken as referring one content to another—(a) necessarily, (β) as such, and (γ) in every instance that may exist. These features are intimately related, if not at bottom identical, but are accentuated severally by different modes of expression, all of which should be retained. The judgment is categorical in character, implying the existence of its subject matter. From it the hypothetical can be formed by a suggested application of the content to a fresh case. But though judgments categorical in form may be hypothetical in matter, the universal judgment always implies knowledge of a connection which is universal and known to be real. The categorical universal is thus at the bottom of the hypothetical.¹

6. So far of the content of universals. What of their origin? Are they in turn inferences from observation, or are they original data of knowledge? That observation plays at least a part in the formation of some of them is scarcely a matter of dispute. We shall then, pursuing the method already laid down, assume provisionally that they are to be explained, one and all, as inferences from that basis. We shall endeavour to discover what they all imply in addition to observation, and we shall ask whether ultimately the assertion of the universal can thus be reduced to one principle, which would presumably be a certain observation together with a certain axiom; failing one principle, can we find *cognate* principles for all inference?

¹ The whole preceding discussion has reference mainly to the account of the judgments concerned by Mr. Bradley (*Logic*, bk. i. chap. ii.) and Mr. Bosanquet (*Knowledge and Reality*, chap. i., and *Logic* bk. i. chaps. v and vi.). Cf. also Mill, i. 5, and Sigwart (*loc. cit.* and p. 212 ff.). To explain the universal as a double negation—see Hillebrand, *Kateg. Schol.* p. 42 is to make a single consequence into the essence of the matter, besides making the universal negation explanatory of the universal affirmative. For the importance of double negation in the collective judgment, see Sigwart, p. 210.

If so, it is at least a good hypothesis that this single or these allied principles are the true and sufficient explanation of the universal judgment. What further verification of the hypothesis is possible will be matter of subsequent inquiry. The formation of the hypothesis, that is, the attempt to reduce all generalisations to cognate principles, or ultimately to a single principle, will occupy Chaps. VII. to XX.

CHAPTER VI

EQUIVALENT AND QUASI-EQUIVALENT INFERENCES

MEANWHILE we have the remaining forms of inference to examine.

(A) *Syllogism.*

1. One of these we have already specified,—the inference from universal to particular,—in dealing with which we shall be compelled to traverse some well-known ground. First of all, let us be clear on one point. The universal judgment alone does not suffice to give me the conclusion. "Ranunculaceæ have five petals" tells me nothing about this flower in my hand until I know that buttercups are ranunculaceæ. This would not be worth mentioning if Mill had not been misled on the point partly by a traditional view of the universal, which he himself, later on, did much to overthrow. If you could never get a true universal, such as we have above described, "All A is B" must be *either* a loose and uncertain statement about A's in general, or a definite and rigidly proved statement about certain A's already examined. A dilemma follows. *Either* the conclusion was one of the A's examined. In that case it was already implied in the All A—it was one of the facts definitely alluded to by the collective judgment. Therefore the syllogism was a *petitio principii*.¹ Or the conclusion was not one of the A's examined. In that case, (1) it did not follow from the collective All A is B; (2) the universal All A is B was a loose judgment, having the same warrant, no less and no more than the conclusion; therefore it could not be used to prove the conclusion. In no case, therefore, did the conclusion follow from the major. It depended really on certain observations for which the major was a loose form of expression. In dealing with

¹ This is Hegel's view (*op. cit.* bk. iii. 1, chap. iii.; *Werke*, vol. v. p. 146) with regard to the syllogism of "allness," i.e. taken in extension. He also argues, like Mill, that in this argument we really rest upon induction. We need not here consider whether this doctrine is consistent with his treatment of what he calls the categorical syllogism (p. 157). Mr. Bradley also condemns the syllogism, when taken in extension, as circular (*Logic*, bk. ii. pt. i. chap. ii.).

generalisation we shall see certain important elements of truth in this doctrine, but as a general theory of the syllogism it goes too far. Once admit (what we postulate for the present) that we can and do make true universal judgments, which are not merely collective expressions for all that we have experienced, and the assumption on which the above reasoning rests falls to the ground. The universal is an assertion about facts prior to the observation of them. Hence the conclusion is not one of the data out of which the major is built up. Nor is it true that the universal as such, by itself, asserts the conclusion, for it says nothing of the position or surroundings of the contents to which it applies. The proposition above instanced does not tell you where you will find ranunculus, or what other characteristics they will have. Now, the minor premiss does tell you this. Hence minor must be added to major if we wish to get the equivalent of the conclusion. We have, in fact, gone through the converse process to that with which we began discussing inference. Then we set out from the minor and found the major wanting. Here we start with the major and find the minor to be its necessary supplement.

The exact function of the supplement is to make the two judgments together *equivalent* to the conclusion.¹ Taking the premisses in combination, we get "Any A - B and this A₊." The conclusion, then, states what is already asserted. There could be no meaning in saying "Any or all A - B," unless we meant to assert B of A₊. The denial of the conclusion would leave one premiss meaningless. Though the major does not take this A₊ to have been examined, yet it is an assertion by anticipation about this A₊ when identified with A. We have then in the premisses the present case ("this") qualified as A, and B asserted of all A's. In this statement both terms of the conclusion are contained. The conclusion, then, does not assert a different fact or postulate any law of the connection of facts. It is the statement in a single judgment of what the two premisses mean when taken together. . . . But to put them together and so draw the conclusion requires a real, sometimes an important movement of thought. This movement is often described as the making explicit what is implicit in the premisses. This is correct if we understand "implicit" in a very precise sense. For, in a way, the conclusion may be said to be implicit in the major alone, viz. on condition that the minor is true. And in a way, as we shall try to show, an inductive generalisation is implicit in the experiment that

¹ What follows is taken with slight modifications from an article by the author in *Mind*, O.S., vol. xvi. No. 64, p. 510.

proves it, viz. on condition that the principle of induction is true. But the conclusion of a syllogism is implicit in the premisses on no further condition at all than that these premisses have meaning. Briefly, generalisation involves an universal principle connecting different facts; syllogism does not.

2. What precisely, then, is the operation performed on the premisses when we "put them together" and "draw" the conclusion? The first operation is simply the assertion in a single act of the contents of two assertions already made, i.e. it is a construction; and the only point of difference between it and other constructions with which we are already familiar, is that it is here applied to a universal and a particular judgment instead of to two acts of apprehension or to an apprehended content and an idea. All we postulate, then, is that the "constructive" activity is thus applicable. Now, this construction gives us "All A's, of which the present is one, have B." Only a part of this content is material to the present purpose, i.e. the purpose of discovering what we can about this A. The act of analysis picks out this part that is relevant, and says this A has B. Here again, we have analysis like the analytic attention which we before described, not adding anything to what is given, but bringing into relief a certain part of what is given. Only here, again, we have to postulate that analysis can be applied to any assertion as well as to the immediately given fact.¹ The content of the conclusion of a syllogism is, in short, *a part of the whole formed by the two premisses together*. To arrive at this point we require construction and analysis of the given.

We have, in fact, in syllogism a case of equivalence, and an equivalence which is not unmeaning tautology. Such equivalence is found wherever you assert a whole of which all the elements have already been asserted (construction) or a part of such a whole (analysis). Whether or not in any syllogism the conclusion is this precise equivalent may be matter of question, but I think a slight consideration of the rules of the syllogism would show that they are nearly all designed to ensure it, while the fallacies are an enumeration of the main ways in which such equivalence may be apparent without being real.²

3. Now to repeat a familiar question, is the syllogism an

¹ I am not clear that it is so much analysis as a simple "leaving out" or "elision" which really takes place. And even that much is perhaps not essential. There may be "three term inferences" which do not use elision, and we may keep all the terms before us in the syllogistic conclusion. Cf. Bradley, *inf.* i. 4. It seems best, however, to state the process in its fullest complexity.

² My whole discussion of syllogism as a process of construction is due to Mr.

inference? (1) It certainly evolves one assertion out of others. That is, the conclusion contains a different fact as occupying a different act of attention from either of the premisses *taken singly*. Now, the putting them together is one side of the actual syllogising—one side of the process of drawing the conclusion, and it is therefore with the premisses as taken singly, one after the other, that we must make our comparison. By this test the conclusion gives us a "new" fact within the limits of our definition of "new." On the other hand, (2) it is a fact of which all the elements are given. Taking the premisses one by one and one after the other, they give the elements constituting the whole which, or a part of which, is now asserted. No fact is asserted in the conclusion which has not been asserted in its totality or in its parts by the premisses. And if syllogism is inference, the "new" fact which inference demands is realised in the assertion of a whole, the parts of which are already given. The whole itself must not have been given as a whole, or we should have a mere circle. But the elements must have been. Then is construction as such inference? Take a collective judgment in relation to its data. A is X, B is X, C is X: therefore A, B, C are all X. Thus is a construction like syllogism. Is it inference? Common sense would perhaps find it difficult to determine. But take memory-synthesis. Remember as a whole what you have listened to or watched for successive seconds. Do you infer the whole? Here I think common sense would give a strong negative. But the relation of whole to parts would seem parallel in all the three cases. The parts are given; the whole is asserted. Where is the difference?

It might be suggested in reply that the "parts" given differ in the two cases. "All my brothers stammer" is a summation or construction of the elementary propositions, John stammers, Thomas stammers, etc. In this case we assert in the conclusion a whole, compound fact, the component parts of which have been explicitly the contents of the premisses. A number of facts are asserted one by one, and then are all asserted together. This assertion as a whole is new, but yet they have all been asserted already. The whole has been asserted, though not as a whole.

Now take a syllogism. The solar spectrum presents the D absorption line which indicates the presence of sodium in the sun's atmosphere. Here, it may be said, the premisses give the

Bradley's account of that operation, *Logic*, bk. ii. part i. chap. 3, and elsewhere. That I have drawn somewhat different results from Mr. Bradley's premises does not lessen my debt to him.

elements of the conclusion in a different sense. Taken together, they are undoubtedly equivalent to it, and that without the implication of any further principle or truth of any kind. But the conclusion is not a composite fact of which they assert the elements. The major gives us the dependence of the absorption line on the presence of sodium universally; the minor, the appearance of the line in this spectrum. Take these statements singly and they assert no part of the conclusion. Take them together and they assert the conclusion as a whole. This distinguishes them from the premisses or elements of other constructions. "John stammers" taken alone asserts an actual part of the collective statement "All my brothers stammer." The relation of part to whole in this instance subsists logically though the judgment is never combined with the further statement that Thomas stammers. But "The D absorption line indicates sodium" contributes nothing whatever to the constitution of the sun's atmosphere, until we learn that the line in question is presented by the solar spectrum. To transfer to logic a metaphor of ancient usage in psychology, the first combination is mechanical, in a syllogistic inference it is chemical—the conclusion has a content in which the premisses no longer appear unaltered.

Now, it is true that syllogism is a construction of a special kind. All construction is the piecing together of asserted contents, and the consequent assertion of the whole thus formed, and syllogism is no exception to this rule, only it rests on a certain special relation of assertions to one another which enables it to piece them together in a particular way. Every assertion is an act of reference to reality, but an universal judgment is, as we have seen, in some degree indefinite in its reference. It refers to all A, but does not specify when or where A is to be found. It is a net thrown at random into the sea of existence which may catch many fish or few. Now the minor premiss does not merely add to the major, but modifies, in a way, the content of the major itself *by further defining its reference*. The major refers to reality at large, but to what reality? Why, says the minor, to *this* among others, or to this at least if to no others. And thus a new assertion is formed. For the characteristic B which the major asserted to be real, without determining when or where, is now, by the defining of the reference, assigned to this particular position. The syllogism then rests on assertions in which the reference is at least partially indefinite; the fresh premiss defines the reference,¹ and the conclusion is

¹ This is the final answer to Mill's difficulty (*Logic*, II. chap. III. §§ 2 and 3).

the existence of the content now definitely referred. We may distinguish such a construction, if we want a name, as intellectual, in contrast to the perceptual or memory constructions in which each content has its reference defined prior to the act of construction.

So far, in analysing syllogism, we have formulated the major premiss "in extension." Substituting the alternative forms of the universal, "A as such is B," "A is the necessary condition of B," we shall get parallel results throwing light on the question now before us, "is syllogism inference?" "A collectivist is necessarily opposed to leasehold enfranchisement" tells me nothing of the views of this candidate, but if he has the approval of the Fabian Society I can draw my inference. That is to say, the major states a connection of condition and result, but does not refer the condition to its place in reality. That reference is given by the minor premiss, and as conclusion the result is also referred to this case. Once more, then, the synthesis is an "intellectual construction." It is the definition of a reference. Above, this reference was regarded as an universal relation, here as a necessary connection. But as before argued, these are like to be either the same or two sides of the same thing.

But these considerations do not after all fundamentally distinguish the syllogism from judgment. Every new whole of thought that is worth constructing at all has some kind of character of its own, which attaches to it as a whole, and only as a whole. And whenever this is so, the knowledge of the parts in isolation is in some important feature distinct from the knowledge of the whole which they form. This feature, that is to say, be it an attribute or a relation, only begins to be recognised when we take the parts together. We cannot get to know it piecemeal. And this is precisely what happens in the case of syllogism, only in a more marked manner. Thus, to take the simplest case possible, we cannot be said to know part of a resemblance when we become acquainted with one of a pair of similar terms. The resemblance only begins to come within our knowledge when both terms are already present. So again with the "modification" of the judgments used in syllogism. We have before us a process of the same character, and presenting the same difficulties which we have already encountered in dealing with the judgment.¹

¹ And they admit of the same solution, for the detail of which the reader is referred to the previous discussion (Pt. I. Chaps. XII.) Briefly, the reality to which the major refers is further defined, but without prejudice to the truth of the premiss as it originally stood. It does not assert less than before, but of the

4. So far, then, we seem to have at most a difference in degree between syllogism and judgment. And even if the difference were greater, it does not seem clear that this would be an adequate reason for classing syllogism as inference. If there may be advance in thought without inference, why should syllogism be classed as inference, merely because it involves advance in thought? The most fundamental division of intellectual processes seems to be that which is based on the ultimate postulates implied. And syllogism, simply as an act of construction and analysis, seems to postulate nothing but what is already taken for granted by the judgment.

Now, the question "what is inference" may of course be regarded as one of words. But we have suggested that by considering the postulates employed a criterion can be found. The conception of universal correlation, or condition and consequence, is not implied by the judgment as such, and we took it accordingly as the differentia of inference. Adhering then to the view that inference is the assertion of a "new" fact on the basis of some distinct content as its condition or universal correlate, the syllogism will be inference wherever its major premiss is a true universal. Such a syllogism is the explicit statement that a certain content is asserted on the ground of an universal relation, and this is why syllogism has been taken as the type of inference. On the other hand, the "advance" made by putting two premisses together is independent of its inferential character, and taken by itself assimilates the whole syllogism rather to a judgment which analyses a whole already before it. Hence the view that syllogism is not inference at all. In point of fact it is inference, not merely as basing one assertion upon another, but because the basis which it uses is an universal correlate, or sufficient ground.¹ It is the formal recognition of the inference from minor to conclusion as being inference, and good inference; it draws a result from a datum which it recognises as the ground from which the result follows universally.

reality to which it refers (the universal connection) more is known, viz. its extension is further defined.

¹ It would follow that the syllogism from a collective major, though formally the same as the true syllogism, is not an inference. And this result seems justified. For (1) if the collective major fully realises its own meaning, the deduction from it is mere verbal rearrangement. "I was present on both occasions; therefore, I was there the first time." The "therefore" cannot logically stand, and the only justification of the remaining words must be that I first mentioned more than was relevant, and then confine myself strictly to what is required. Here the major is a true collective. The individual instances collectively referred to are each distinctly realised. There is no bond *facti* intellectual advance, but at most a mere restriction of attention. But (2) the

(B) 5. In a syllogism the minor term is not of course always immediately present. It may be a fact of memory, or a collective, or even an universal judgment. When the subject is of this more complex character, new relations appear to be involved in the conclusion. If we have an individual, $A - X$ or $A - Y$, which as A is brought under the general relation $A - B$, it would seem that we get not only $A - B$, but $X - A - B$, or $Y - A - B$, and that without any further act of inference, or at most by a construction of $X - A$ and $A - B$. Thus suppose in some geometrical figure I have the line $C - A$ given, and have proof that the point A is at distance $A - B$ from B , it might appear part of the same conclusion to assert $B - C$. If C is related to A , and A to B , B must be related to C .

But here a distinction must be drawn. The syllogism subsumes A (and therefore $C - A$) under the universal relation $A - B$. From this it is clear that C is in some relation to B , but *what* relation? So far as the syllogism in question goes, i.e. so far as we confine ourselves in the conclusion to the strict equivalent of the major and minor taken together, all that we learn as to C and B is that they are both related to A , or at furthest, that C is in that relation to A which is constituted by the two relations $C - A$ and $A - B$. In the diagram



"collective syllogism" is a reality when the collection referred to is, for instance, partly forgotten. "It certainly rained on Monday week, because we were in Yorkshire on that day, and I know that it rained every day that we were there." This looks more like inference, and is certainly a genuine process. In fact, the collective judgment here—originally a mere summary of a series of observations—is partly disintegrated by forgetfulness. I remember the broad result of my observations, but have forgotten the detail. The judgment, in fact, is on the way to become a "true connection of contents," based ultimately on my confidence in the value of my mental note, "it rained every day." And the process is so far a true syllogism that the minor defines or re-defines the reference, by specifying its application to last Monday week. But as an "advance" the process is fully open to Mill's objection of the *petitio principii*. The "mental note" must have been derived from the conclusion itself. It presupposes the conclusion and cannot act as its logical condition. The same may be said when paper notes are in question.

"What's your Christian name, sir?" angrily inquired the little judge.

"Nathaniel, sir."

"Daniel. Any other name?"

"Nathaniel, sir—my Lord, I mean."

"Nathaniel Daniel, or Daniel Nathaniel?"

"No, my lord, only Nathaniel—not Daniel at all."

"What did you tell me it was Daniel for, then, sir?" inquired the judge.

"I didn't, my lord," replied Mr. Winkle.

"You did, sir," replied the judge, with a severe frown. "How could I have got Daniel on my notes, unless you told me, sir?"

This argument was, of course, unanswerable.

we are given $C-A$ and $A-B$, and this amounts (by construction) to the relation $C-A-B$. But to assert $C-B$ as the determinate relation given in the diagram is to make a further step, a step which is not taken if we confine ourselves to the strict content of the syllogism.

Though a different step, it is clear that the inference is immediate. Given $C-A-B$ as above, we infer $C-B$ without any difficulty. This inference is seen in many forms, "12 is twice 6, and 6 is three times 2, \therefore 12 is 6×2 ." Here we have two relations of numerical proportion, from which a third, which we may call the resultant relation, is at once inferred. And we shall try to show later on that the operations of arithmetic generally are inferences of this kind. Geometrical instances we have already taken. But we may notice that axioms important both for geometry and arithmetic—like "things that are equal to the same thing are equal to one another"—appear to be merely general statements of certain resultant relations, like those here described. So at first sight, at least, are "serial" inferences, like "What is greater than A is greater than any B, which is less than A." Or, "If A is to the right of B, and B to the right of C, A is to the right of C." A before B, B before C, \therefore A before C, and so on indefinitely.¹

In all these instances we have two relations given and a third relation inferred, and the process involved does not at first sight correspond with any hitherto described. Though it may be formulated in two premisses with a conclusion, it is not, as has been shown, a syllogism. To regard it as a generalisation from experience is simple enough at first sight—for why should we not learn the resultant of two relations by observing it in some given case? But the difficulties of this view come out when we realise the long and circuitous path by which our ordinary generalisations are reached, and contrast the labours and logical dangers of the road with the obvious simplicity of a geometrical calculation. It remains to treat these assertions as perceptual constructions. Two and two are seen to make four—four is the whole perceptually constructed from those elements. But here again a question will arise, for these constructions are applied to elements never perceived, and in some cases only resembling known instances in certain highly abstracted qualities. Now, perceptual construction, as we have hitherto known it, has dealt with the given and the particular. How then

¹ The emphasis laid by Mr. Bradley on instances of this kind is not the least of his many services to logic.

can it be asserted of that which is not given? We shall treat these questions later on. Meanwhile we note what we may call the "conclusion to the resultant" as *prima facie* a special case of inference.

(C) 6. It remains to deal briefly with the so-called immediate inferences. Of these, the disjunctive and hypothetical forms are plainly analogous to syllogism, depending on construction, or the combination of construction and analysis. The hypothetical inference, indeed, is merely syllogism in a verbally different form. Instead of "All A - B and this A," we say, "If A then B, and this A." The conclusion, "This B," bears precisely the same relation to the premisses in both cases, and for present purposes the major means the same; only, instead of explicitly referring to the (indefinite) multitude of cases in which A and B are, or will be found related, it refers explicitly to some one supposed case. The tie that unites A and B as such is the real basis of either form of the judgment.

In the disjunctive inference, A is either B or C; it is not B. \therefore it is C, the major really combines two terms, one of which, the predicate, is partly indefinite. The correlate of A may vary within the limits B and C. The minor cuts off part of this area of variation, presumably as the result of some separate train of inferences. Combining the two pieces of information, we get the conclusion A is C, which is then as before an assertion of a content which is the equivalent of the premisses taken together.

Passing to conversions, A is B. \therefore B is A, taken strictly, is a mere equivalent, and here the second judgment is not a summing up or analysis of the first, but looked at from the point of view of the content asserted, is simply identical with it. We have here an equivalence which is not an inference but a tautology. The real difference is in the mental attitude and the consequent suggestions. The mind travels over the content in different directions. In the first instance, A is full in the focus of consciousness, as B is rising, in the second, B is in the full light, while A is relatively on the outside. This will, by well-known psychological laws, alter the suggestions of the content, at least as regards the ease and distinctness with which they are made. The transposition is therefore of rhetorical rather than logical value. "Who deniges of it, Betsy?" inquired Mrs. Gamp; and then Mrs. Gamp, by reversing the order of the question, imparted a more awful solemnity to it, "Betsy, who deniges of it?" This is the philosophy of all conversions,

and all substitutions of one verbal equivalent for another, in a nutshell.

By altering its suggestions the tautology often apes a new statement. It may do this if it pleases, but it cannot play both parts at once. If it is a new assertion it is not an equivalent, and it requires justification by some principle of the connection of facts. If it is not a new assertion it is a mere tautology, and nothing further. It is the business of rhetoric and all the arts which have as their object the perfection of language, regarded as the instrument for concealing our thoughts, to slur over these leaps and jumps. It is the business of logic to point them out. Hence he would be a bad logician who should contend that in immediate inference we get a genuine advance from a single premiss to a fresh fact without the implication of any connecting principle. He would, in fact, betray logic to the rhetorician. I conclude that all judgments claiming to be inferred from some other single judgment without the implication of any connecting principle are really tautologies, and not inferences at all. They do not express different facts, but are different ways of asserting the same facts.

7. To sum up the types of inference, as we have found them on a surface examination, we have first, generalisation or induction, in which we assert an indefinite number of facts that are not given on the strength of certain other facts that are given. This is the clear case of the assertion of a "new" fact. Secondly, we have deduction or syllogism, the combination of an universal judgment with a particular, giving a conclusion which is an analysis of the whole combined. Here the fact asserted is new as a whole, but its elements are already asserted in the premisses. The inference from minor to conclusion, or from particular to particular, is logically a combination of these two forms, and not a distinct type. Thirdly, we have a combination of two or more relations and an assertion of the resultant relation. We have yet to consider whether this is a distinct form or not. Lastly, we have so-called immediate inferences, some of which are cases of construction like syllogism, while others are not really inferences at all. On the first showing, then, we have three types of inference. Of these we have analysed syllogism, and found that if we take its premisses for granted it involves no principle connecting different facts, for it suggests nothing beyond the totality of which they assert the elements. Its constitutive factors are construction and analysis. But it is an inferential act, as explicitly recognising the dependence of a result

on its condition. But the consideration of this dependence merely throws us back on the general problem of the universal judgment. It remains, then, for the following chapters to examine the two chief types of inference. Of these we consider, first, generalisation, and inquire what principles this inference implies if it is to be valid.

CHAPTER VII

THE BASIS OF GENERALISATION

FROM more than one point of view the preceding chapters have forced on us the question, how generalisations come to be made, as the fundamental problem of inference.

The question, it must be remembered, is for us one of logic and not of psychology. We have nothing here to do with different orders of intellect and their different tendencies in the matter of seeing connections, or detecting the general in the particular; nor have we to classify, compare, or analyse different classes of general ideas or different modes of forming them, regarded simply as intellectual products. We have rather to investigate the conditions upon which generalisation is valid; to inquire what must hold true if a generalisation is sound, in other words, what any given generalisation implies; and thus to arrive, if we can, at the criteria distinguishing true from false generalisation.

Our method must therefore be to begin with certain methods of arriving at general judgments, which are commonly recognised as valid, and which are in actual use by skilled reasoners giving results recognised by common sense and trained reflection as true. We shall analyse these methods, and consider with regard to each, whether its premisses are the logical equivalent of its conclusions. If they are not, we shall have to consider what further judgment must be combined with the premisses to give equivalence. Supposing such judgment to be found in any case, it is clear that the method will be valid if the judgment is true, and we may call it the principle of the inference. Hence the next question will be, "Is the principle true?" To determine this will take us outside the question of inference proper, but in these chapters we shall make a first step by considering the relation of the several principles of various inferences to one another. If we can reduce them to unity or interdependence, it will be clear that the whole body of inductive inference stands or falls

together, and this we shall see later on to be a very important consideration in discussing its validity. Finally, if all inductive reasoning can be reduced to a single principle, we can in turn compare this principle with the assumptions made by other kinds of reasoning, and push further our search for unity and interrelation.

To carry out this scheme in its entirety would involve, as a preliminary, an exhaustive enumeration of every possible method of inductive science. But we shall not make so ambitious an attempt. We shall pursue the hypothetical method already applied to other processes of knowledge. We shall start with ordinary inferences and methods of criticising or substantiating inference, and we shall apply the principles on which they seem to rest to the leading types of method already recognised as sound in logic or in science. If we find that the same principles underlie valid inference in all these cases, we shall assume provisionally that we have here the true principles of inference.

1. "Now, when I connect truths together, or reason, what do I do that I leave undone in judgment? I support my inferred judgment by some other assertion. If I say A will be B,¹ and am asked why I say so, I answer because A was B. If I say, the clear sunset this evening will be followed by a fine day to-morrow, I give some proof of my assertion when I adduce the clear sunset of yesterday and the fineness of to-day. Now, I may be answered by a doubter upon two lines. He may say "A₁ and A₂ are not really alike. Yesterday's sunset was clear in the sense of cloudless, to-day's in the sense that the air is transparent." Or he may say: "Yes, A₁ and A₂ are alike, but there is something beyond these which makes the difference. With yesterday's sunset went (say) a certain direction of the wind, and it was that which really determined the fine day. That concomitant is not present now." This gives us roughly the two conditions of inference, which we have to define further.

(i.) "A₁ and A₂ must be alike. I use the notation A₁, A₂ to express that they are different facts, observed, that is, at different times or places, but that in character they are precisely similar. I say precisely, because it is only so far as they are similar that I have any basis for inference. It may be that I never get precise similarity; but I do find points of precise similarity, and it is from these that I argue. The terms I use in describing a fact always allow a certain latitude. I call many different shades of colour red. But the more latitude

¹ From an article by the writer in *Mind*, vol. xvi. No. 61.

is allowed, the more difficult it is to argue with precision. If I can argue at all from one red to another, it must be because just in point of redness there is no difference between them; they are both equally red; in that point they are precisely similar. Argument, then, is precise in proportion as similarity is precise.

(ii.) "But though A_1 and A_2 are precisely similar, there may be some change in the concomitants of A outside A . This change, again, may or may not affect B . When I infer A_2-B_2 , then, I assume either that there is no such change, or that no change outside A makes any difference to B . We will consider presently what we mean by 'making a difference.'

(iii.) "Observe now the implication of inference. If I do argue from A_1-B_1 to A_2-B_2 , I imply that $A-B$ holds always; that given an A we shall always have a B in the same relation to it. This, of course, is the point always brought out by cross-examination; and has already been discussed. We shall see that it follows at once from the general principle of reasoning.

"We can, in fact, always argue from A_1-B_1 to A_2-B_2 , unless there is some change in the concomitant facts which makes a difference. This formula holds of any sort of inference, from the barest analogy upwards; only, in the case of a mere analogy, we have really no sort of ground for supposing that there will not be some change which 'makes a difference.' If I argue: 'X sat down thirteenth at table, and died within the year; you have done the same, therefore you will die,' I pay no attention whatever to the concomitant facts. X may have been in a consumption. The consumption, then, is the fact that makes the difference. It was the consumption which produced X's death, and having assigned that as the cause, and discovered that it is not present here, I have no ground for the conclusion. But it remains that there must be some such fact discoverable, or otherwise the inference from A to B will hold universally. The fact in question may be something of which A is really a part, or it may be something quite separable from A , or it may be the absence of counteracting causes, or, to phrase it differently, the presence of conditions which are neutral to the effect. We will go further into these cases presently. Meanwhile we must observe that the phrase 'makes a difference' requires further analysis. Such an expression involves some activity or causative power. This is a specific conception, and we want one that is general. What we really mean when we say there must be some change which makes the difference, is that there must have

been some fact which is always connected with the consequent, and which is not present now; in other words, if A is not always in the relation which we observed between it and B, then there was along with A some third fact C, which does always go with B, but not always with A. As I said above, this third fact may bear any sort of relation to A; it need not be entirely separate from A, but involves more than A pure and simple. We now see that, whether we accept or reject an inference, we make the same assumption of the universality of relations and no other. In the one case we assume A-B universal, in the other C-B."

2. We can now take a preliminary view of the considerations appealed to when we argue to an unobserved case. Here is A_2 , and we want to know if B_2 will follow. Then first of all we may appeal to a parallel case A_1-B_1 , and having found this case, we might be satisfied and conclude, for example, that it will rain to-day because it rained last Friday. But then reflection and experience warn us that circumstances alter cases. There may be a difference here which will affect B, and we must look out for this, and find C which in another instance was followed by D which is exclusive of B. Then from the difference C we argue, again be it observed by parallels, to a difference here. But in either case one caution is necessary. To argue at all from any A to B, we must be able to assert the connection universally. If it is a ground for argument in this instance it must be so always, and hence a negative condition of inference, that if I use A by itself as an argument¹ for B the relation A-B must be uncontradicted in my experience. I may know one instance or a thousand, but I must know no instance of the opposite. It is the same with the counter consideration. The difference C is of no avail as an argument against B, unless it is always in my experience followed by a change in that respect.

For any result, then, which we desire to know, experience may supply us with arguments both *pro* and *con*. But in either case, whether we are arguing from similarity of the antecedent in favour of a consequent or from differences in the accompanying facts against it, our argument rests upon parallel cases uniform in our experience. And in either case, if we argue to this instance, we must argue to all like it. Hence it appears that to argue in this fashion is to generalise an observed relation. And further, by a similar line of reasoning,

¹ *I.e.* as a sufficient argument. The conjunction of A with B in some cases, though not in all, may be a ground of partial or probable argument, for reasons which will appear later.

it would appear that if we can thus generalise any one observed relation we must also be prepared, unless there are special reasons adduced to the contrary, to make the same use of any other. And thus not only is every universal judgment based upon an observed relation, but the converse also is true, that any observed relation A-B is as such a basis for generalisation.

I say as such, meaning that it is a ground for generalising in the absence of any other consideration bearing upon the subject, and so our ordinary unreflective intelligence treats it. We all in our daily life and thought assume that what has been will be, and that simply because it has been and without attention to other considerations. To the average man, the sun will rise to-morrow because it "always" has risen, and the seasons will follow one another because they "always" do. Nor is this anticipation a mere habit of mind which grows with experience. On the contrary, it is checked by experience, and is strongest where experience is weakest. The baby, whose memory is just long enough to reach from day to day, expects each daily sequence to repeat itself. Washing, dressing, meals, and games are expected—at least by many babies—to follow in a particular order, and the most seemingly trivial things are remembered and expected in their place, and imperiously demanded. For the baby, like a true lord of creation, imposes his own axioms on nature. He not only expects the future to be as the past, but he demands it, and if he does not find it there will be consequences. The order he knows is no mere mechanical sequence, but a sacred ritual which he imposes on himself and others, and which must not be infringed.¹

Wider experience makes it clear to the reluctant mind that the expected does not always happen, and that uniformity may be exaggerated. Confidence in the first hasty generalisations is diminished, and attention is called to more complex considerations. The logic of conflicting considerations is simple enough. If any observed conjunction is as such, that is in the absence of other grounds, a good basis for a universal judgment, then this assumption must apply all round to any of the elements of a complex case. Now, in actual experience we never get any conjunction, naked and bare, standing out in clear and sharp cut isolation from all the other facts of existence. Such

¹ Observation of babies up to two or three years would certainly seem to bear out the view that belief and liking, disbelief and objection, are in their origin scarcely distinct. They are both forms of acceptance and rejection of a suggested content, and for the baby do not appear to be separable.

isolation is always artificial. It is a mental abstraction, and not in the most careful experiment a physical fact. And thus our $A - B$, which we want to connect, has always a C accompanying it. And if in our experience a change of C is followed by a change in B , then by our own principle this change must be generalised. Thus a wound is charmed by a "white witch" (A), and, at the same time, carefully dressed by a surgeon (C), and at length it heals (B). If by other experience C and B vary together, so that with C you get B , and without it you do not, the witch has no standing ground. Xerxes' magi prayed for four days that the storm would cease, and then at last their prayers were successful—"or perhaps it stopped of itself"—for storms *do* mostly cease after a time. Doubt, then, arises logically from differences in the combinations in which phenomena are found. Our reasons against a conclusion have the same logical ground as our arguments in its favour. That is, they rest on uniformly experienced conjunctions. So far as this case is similar to that we have reason to expect a similar consequent; so far as it differs in a way which, in our experience, is conjoined with variation in the result, so far we have reason to doubt or deny; and, in accordance with our original assumption above, no other consideration can enter in. If there we contend that the only ground for affirming $A_2 - B_2$ must be an observed parallel case, so here we must allow that the only ground for denying it must be an observed change, $A C - B, A D - E$. Hence an important result. We have dealt so far only with the possible considerations *pro* and *con*. We have not considered their value singly or together, we have shown no method of weighing one against the other. In fact, our full account of this balancing of reasons must occupy us later; but at present we may draw this deduction. Any uniform relation may be generalised, that is to say, the fact that we found it uniformly in our experience is as such a ground for believing it to be universal. The only consideration which could negate this is the observation of a change affecting the consequent. If, then, in any case a uniform relation $A - B$ be observed, and a change is nowhere found in our experience to be followed by a change in the consequent B , then the generalisation $A - B$ is certain. That is to say, similarities and differences are both partial considerations, and either taken alone give inadequate results. The fuller view—and here, as elsewhere, "the whole is the truth"—considers both and weighs them. If the considerations in favour of the result are complete (i.e. the similarity $A_1 - A_2$ is perfect) and the considerations against are *nil*, it is logical to affirm it without doubt.

INFERENCE

Thus the true and certain natural law is that which no differences affect. Visible or tangible matter gravitates under whatever form or in whatever circumstances: "fire burns both here and among the Persians."

3. So far our principle relates to inferences beyond the range of observation, and deals only with grounds of belief, *causae cognoscendi*. But a consequence follows for sequences within the range of our experience and for "*causae essendi*." A relation $A_1 - B$ is observed and compared with a different case $A_2 - D$. The south wind brings warmth and sunshine to-day, while yesterday it brought a storm. Now *prima facie* no difference in the concomitants of A_1 and A_2 may have been observed. But assume that no difference existed. Then, according to our principle, we might start from either instance and argue in this way. The south wind brought a storm yesterday, and it blows again to-day. No difference exists in the accompanying facts, or at least no difference which is associated with sunshine instead of storm. Therefore the sunshine is an impossibility. But, by the second observation, it is a fact. Hence, if our axiom is to be saved, the assumption that there was no relevant difference between the cases must be dismissed. There must have been a difference, and that difference, as we say, "accounts for" the change.

What is meant by this last phrase? Naturally, we should say, it means that the new conjunction is universal. That is, the change C is always followed by the difference D , or, to put it more fully, the change from A to A C is followed by the change of the result from B to D . Thus a given force (A) sets a body in motion (B), and always does so unless there is a counteracting force (C) which keeps it at rest (D). But now a further complication arises. Is $C - D$ really universal. May not the counteracting force itself be counteracted? Of course it may, and then the original motion (B) will result after all. Thus our first "difference" C may be affected in its turn by other differences E F G , and so on indefinitely. Then all we can say of C is not that it is followed by D universally, but that it is so unless there are further differences E , F , etc. In short, C must at least be followed by D in circumstances similar to those observed.¹

It appears, then, in accordance with our principles of inference that it would be a contradiction to suppose two quite similar antecedents with different consequents unless we admitted a difference in the accompanying facts, and allowed

¹ Of course this is not the full philosophy of "counteracting causes." More will be said on the subject later.

that the two differences would be connected in the way explained. We have arrived, therefore, at a result claiming to hold of all facts as such whether observed or not, and stating relations which it should seem must be true of them, matters of fact, and not merely grounds of inference. We may formulate this axiom.

"Any observed relation $A - B$ will be universal unless it has concomitants, a change in which is universally followed by a change in the relation itself."¹

4. From this it follows, further, that among the antecedents of a phenomenon it must always be possible to find some one or more, simple or complex, positively or negatively determined, which will always, in whatever circumstances, be followed by that phenomenon. For let E be the mass of concomitants, a change in which is followed by a change in B . Then if E be unchanged B must follow, i.e. B follows upon $A - E$ universally. Now the whole $A - E$ may not be essential in all cases. There may be any number of changes possible within $A - E$ that do not affect the consequent, and there may also be any number which do. And we may not know which is which. But this much we can say, that whether in the whole $A - E$ or in some part of it, facts are to be found from which the consequent B will follow universally. This is the law of the ground, and, as applied to events, the law of causation.² And thus with regard to the change C we can go a step further than was possible before. There must, we may say, be some fact; if not our original C , then some kindred C which, not only in a similar context but universally, is responsible for the change in our consequent. And this change may act in one of two ways. Either there may be certain facts C accompanying the case $A - B$ and absent when B is absent; or there may be r which is always followed by B instead of B , and which was absent in the case $A - B$ first observed. Now, if we so define C as to include any possible C and exclude any r ; if that is, we take our antecedent as both positively and negatively defined in every way relevant to B , then C will be B 's universal antecedent, if A is not. This universal may, as we have said, be the whole mass of antecedent phenomena, or it may be a very small part, and which it is we have in any case to find out.

¹ Thus phrased, the axiom does not as yet raise the questions of "plural" or "counteracting causes." All it says is, when the consequent is changed there must (a) be some change in the antecedents, and (b) this change must, as taking place among those antecedents, be universally followed by the altered consequent. The analysis admits, as we shall see, of being carried further.

² Cf. Richl, *Der Philosophische Kriticismus*, vol. ii. part i. p. 240. That the law of causation is a fresh assumption is noted lower down, Chap. VIII.

But in any case B must have some universal antecedent,¹ "that fact may be A, and if so we can infer from A to B; or it may be C, in which case we cannot infer from A to B. It may be that A, which struck us in connection with B, is the fact always related to B. If not, it is some other fact. There always is some such fact to be found. Thus in inferring to $A_1 - B_1$ I imply A always - B; and that again implies that there is no C always - B which is not itself always related to A.

Our reasoning, then, involves that any fact, as B, should have some other fact, as C, to which it is always related. By this is meant that any fact precisely resembling this C, whatever its other attributes and concomitants may be, will be found to have a precisely similar B in a precisely similar relation to it. It does not involve that any A to which B happens to be related here should be always related to B. And hence the proposition which is to hold good of any two facts whatever, that are observed in any relation, must present us with an alternative. Either the relation observed holds always, or there is some other fact present in the observed case always related with one of our two facts and not with the other. Hence we may put the axiom thus:—

If a fact A_1 is observed in any relation to a fact B_1 , then any A will be in that relation to B, unless among the facts in relation to B_1 there was some fact other than A alone which always has B related to it as in the observed case, but is not always related to A as in the observed case.

I have here put the axiom as if A were the fact presented to us in some second case. But obviously the order makes no difference. If it were B that were presented to us we could say the same of A.

My object in putting the axiom thus is to phrase it so that it may hold of any sort of fact, and by "fact" I mean anything that strikes our attention, and that we speak of as a fact, whether we bring it into a unity naturally or artificially. However much or however little of the "work of the mind" there may be in it, whether it be a substance or a well-defined attribute, or the first rough apprehension of an attribute or a statement involving a complicated system of parts, inference assumes this judgment to hold true of it. The word "relation" also needs a little explanation. As we use it, we mean to assert it not only of a fact that is before or after another, or near or far from another, or like or unlike another, but also of a fact which is an attribute of another which is its substance, or which is conjoined with another as a second attribute of the

¹ From the above-cited article.

same substance, or as a second aspect of a complex mass of facts. A relation, as we have tried to show, exists between two facts whenever the mind can at once distinguish the facts as two, and, at the same time, attend to them together and assert something of them considered together.

To illustrate my meaning, let the observed relation be exposure to cold followed by inflammation on the lungs. Here A is exposure to cold. Now, I am quite aware that such a fact as this cannot exist in isolation. It was, of course, a particular concrete case of the exposure to cold of a particular person. Quite so; but *all we may know of it* may be quite inadequately represented by the bare words, "exposure of a man to cold." Of course, the more I know of it the better for my powers of drawing inferences, but as soon as I begin to know such a bare fact as these words express, I begin to have some basis for reasoning. The same remarks apply to the term B. Hence, without knowing anything more of A and B than is expressed by such words as are used above, and the fact that B did follow A, I can say that in this case again, or in any case, B will follow, unless in the first case B was related to some third, C. Now this third, C, might be something quite apart from A: it might be, for instance, the continual inhaling of iron dust; or again, it might involve A and something more, e.g. it might be exposure to cold following great heat, and in an exhausted condition on the part of a man with weak lungs. To get at the whole fact which would really and strictly be *always* followed by inflammation of the lungs, we should doubtless have to go through something very complex. But in the broad sense I have given to the word "fact," with the object of abbreviating the formula, it would hold that *some* fact could be found always related to the fact inquired about.

Let us take another case: a pistol-shot, A, caused death, B. Now a pistol-shot might not cause death. What does cause death? Let us say, a projectile aimed in one or other of certain definite directions, and with not less than a certain energy. If I shoot a man and aim straight at his brain or his heart, and am near enough for the ball to penetrate, I shall kill him. Thus I can find a fact standing in universal relation to my B. But it is not something out of all relation to A. A, the pistol-shot, is a vague phrase expressing one aspect of the whole fact—the aspect which would first strike a bystander. The C, which is really connected with B, involves A and something more. The whole fact can be analysed, of course, into any number of "latent processes," and again has any number of aspects. Now A is just that aspect which happens to

have struck us. C is here some fuller account of the whole fact."

Lastly, in a purely frivolous or false inference, the C, which is really in relation to B, is something quite foreign to A. Here the repetition of A is no ground whatever for expecting B. Their concurrence is what we call "casual." Nevertheless, here too B has its ground and so has A, and so too has the concurrence of A and B. Simple or complex, every fact has its ground, if we can only find it.

If these views are correct, it results that sound inference—judging soundness by the conditions and criteria to which appeal is made by ordinary common sense—involves an assertion about relations of any and every kind found in reality in general. Given $A_1 - B_1$ in any case, and given A again, we shall find B, unless with A_1 went C_1 , C being such that C - B is universal. This principle is simply the application to any observed relation of a principle asserted of all facts, viz. that "every fact must have its universal." Grant that B must have its universal, and that universal must either be A or something else now present.

I conclude, that in generalisation we start from a given conjunction of facts, and infer that wherever one of those facts recurs, the second will recur in a similar relation to it. Such an argument can only be negated on the ground of a parallel argument from other conjunctions similarly given in experience. When such counter considerations fail, the argument from the given conjunction claims certainty. This claim can only hold if a difference in the conjunction is always referable to a change in the concomitant facts. And this implication postulates in turn that every fact, without exception, has a ground from which it follows universally. These distinct, but connected positions, are the axioms implied in generalisation. The question of their validity must occupy us later.

CHAPTER VIII

DEVELOPMENT OF THE PRINCIPLES OF GENERALISATION

1. EVERY fact we have just concluded must have its ground, that is, its "universal."

But when we speak of an universal, we may mean one of two things. The relation $A - B$ is universal in one sense, if given A we always have B , i.e. if B is the universal consequent of A . This is the ordinary universal of hypothetical judgments, and the " A " propositions of formal logic. In another sense $A - B$ is not universal, unless we can argue not only from A to B , but also from B to A , so that either of them relatively to the other is a "*natura alia quae sit sum natura data convertibilis*." Which sort of universal does inference imply? The second alternative, of course, assumes a good deal more than the first. It assumes, for example, not only that every event has a cause, but that it has only one cause, obviously a much larger assumption, and one that has been denied, and indeed, is *prima facie* opposed by obvious facts. Where is the common element in such causes of death as cholera, prussic acid, and a bullet through the head? We shall leave the discussion of the subject to a later chapter, premising here that the doctrine of the single ground does not seem to be necessarily implied by the inductive methods, in which case it could not, in our view, claim to rank as axiomatic.

The "plurality of effects" is a different question, and must be very differently dealt with. The phrase suggests that an antecedent may have very different consequents in different surroundings. And at the first glance this expresses an obvious truth, too obvious to need comment or illustration. But let us see how the matter works out on a further analysis. We have a whole AB with a consequent ab ; and it is suggested that in different contexts, as C or D , the effects of A and B might be different. Now, if AB is the total cause of ab , there seem to be three possibilities. Either a follows from A , and b from B as such; in which case *cadit quaestio*; or B (say)

has as such an effect $\alpha\beta$, which is modified by A into ab : or lastly, A and B have no effect as such independently of one another, but only as forming the whole AB.

I begin with the second case. It is assumed here that B as such has a certain effect $\alpha\beta$. When A accompanies B, this effect is modified and becomes ab , and the question is whether this change is due to A as such. Let this modification be αb , so that the combination $\alpha b - \alpha\beta$ gives the whole ab . Now this modification cannot be due to B, for then B would modify its own consequent: but by the law of causation it must have a ground from which it follows universally; this ground must therefore be A. Or we may put it, the difference in the consequent must be due to a difference in the antecedent, and that difference is A. But it may be said, A may be followed by this difference only in the context AB. But, we shall reply, A must have a precisely similar consequent in every context, except so far as the concomitant facts alter it. A as such cannot alter its consequent merely as being in a new context. The alteration will be such, and only such, as follows from the context. Conversely, what does not follow from B must depend on A alone. But we know already what difference the context makes: B as such causes $\alpha\beta$, and it modifies the consequent of A precisely by $\alpha\beta$, no more and no less. Hence the change in $\alpha\beta$ which makes it ab must be due to A alone. Let this change (to discover which is a problem for analysis and construction) be αb . Then, αb is the effect of A as such, i.e. universally. Not the whole ab , nor either part of this whole, then, will be due to A as such, but an element in ab , discoverable by analysis, will proceed from A universally.

But now suppose that neither A nor B has any effect at all. Is it then possible that combined they can have the effect ab ? Consider: A as such has no consequent; but it is modified by B. But the result of B must be something due to B as such. But to B as such nothing is due. It results, then, that if neither of the elements has any effect as such, the whole can have no effect. And it remains that both elements must as such have their effects which follow from them universally, and enter into their joint results as elements distinguishable by analysis.

We must conclude that the uniformity of the effect is a direct deduction from the principle of causation. If any consequent is due to A as such, it follows from A universally; and if a modification is introduced into any concrete effect by A, the change constituting that modification will follow from A in any other context. It must be understood that this

change is not identical with the sensibly apparent modification observed. But it is that fact *which, in combination with the other consequents present*, forms the observed total consequent. Thus a force P acting on a system S produces a motion V . Here is the apparent sensible effect. But this is not constant. For a precisely similar force P_1 , acting on a different system z , produces equilibrium, E . What then is constant? The strain produced by the force. This strain is such that, combined with the other elements present in the two instances, it constitutes in the first case the whole V , in the second E . Not the sensible fact as such, but its elements, even its differences as recognisable by thought on analysis and construction, give us the true universal consequent which it is our object to find if we are to understand the nature of things.

Hence, in any sequence $AB - b$, a change *such as combined with β constitutes the whole b* must follow from A as such, or not at all. Call this change α , and there is nothing to prevent its being such that $\alpha + \beta$ is a sum of elements constituting the whole b , while $\alpha + \gamma = c$. The discovery of such true "identical" elements, of course, depends on our being able to dissect given wholes with sufficient accuracy of analysis, and to form wholes of the requisite complexity of elements.

2. So far our axioms have dealt with logical antecedents and consequents only. They have said nothing as to the spatial or temporal relation in which these stand or may stand to one another. Yet on this point ordinary thought makes two assumptions. First of all, it *generally* assumes that looking at a fact as an event (and every fact, I suppose, can be looked at as an event), its logical antecedent is also its antecedent in time, or, more strictly, that among the logical antecedents (grounds) of an event there is always *one* immediate temporal antecedent (cause). A fact may have any number of logical grounds (i.e. facts from which it can be inferred), but only one cause. That as an event¹ it must have a cause, in our sense, is the law of causation, which results, as we at present assume, from the application of the law of the ground to time, though *how* it results we must inquire later. And secondly, ordinary thought assumes perhaps with some vagueness that antecedent and consequent must be in some close proximity in time and space, which, when analysed, amounts to this, that cause and

¹ The question whether the law of causation applies universally simply stands or falls with the prior question—*are all facts to be regarded as facts of space and time?* So far as we regard justice, or geometrical proportion, or a dramatic effect, or a "coming into being," they have, I suppose, temporal antecedents or consequents, falling under general laws applying to temporal relations.

effect must be continuous with one another in space and time. No doubt we often speak of some comparatively remote event as "the cause." We speak of the admission of the Goths by Valens as the cause of the fall of the Western empire, and perhaps even distinguish it as the proximate cause from remoter things, like the institution of the Colonate or the over-centralisation of the imperial government. Yet something like a century elapsed between the blunder of Valens and the deposition of Augustulus. But this century is not a hundred years of "empty time," but of quickly moving events, each of which led on step by step to the consummation. The more accurately we think and observe, the more we fill up gaps in our sequences, and reduce them from a series of jumps to a continuous change. And when, finally, no apparent change can be detected between the facts which we believe related as cause and effect, we are forced by our thought to fill up the gap with a *Latens Processus* of some sort or other. If a poison takes an hour to work, we are sure that that is because an accumulation of imperceptible changes is necessary to produce the gross and palpable after-effects. If a muscle contracts after a long latent period, there is obviously some molecular change going on in the meantime, though invisible to our eyes. Similarly as to space. A disturbance which arises here and has effects there must in some way have propagated itself all across the interval. Things may perhaps "act at a distance," but not without somehow acting all through the distance, and so thought is never wholly satisfied with a theory which does not point the way to a continuity of this kind.¹

Such appearing to be the general assumption, tacit or avowed, as to what we call causation, i.e. universal correlation in time and space, does it bear any relation to the law of the ground? I think it follows clearly from the application of that axiom to the facts of time and space. For it is contained in this axiom, that time and space, as such, make no difference to the conditions determining phenomena. The law states that any fact X must have a fact Y from which it follows universally. That is, given Y we must get X, at whatever time or place. The only thing that can make any difference is a change in Y itself—i.e. a change of character. The

¹ Of course, this objection may become a prejudice, as, I suppose, in the opposition once offered to the gravitation theory. The objection, then, could have point, not against the laws of falling bodies as an empirical result, but against the suggestion of their being an ultimate account of the nature of the forces involved.

definitely qualified facts found in time and space have each their appropriate antecedents and consequents, and these last differ as, and only as, the qualities of the facts differ. The numerical difference, the mere occupancy of a different position in the universe, makes no difference to a thing's antecedent or consequent.¹ This is just the negative side of the axioms of reasoning.

But now, suppose a fact A with a consequent B, and suppose B to follow A after a certain interval of time. Two things are possible—either the interval contains a continuous process, stages in which may be marked as A a a b B, such that every link in the process determines and passes continuously into that which follows; or the intervening facts have nothing to do with the production of B. In that case, so far as the relation of A and B is concerned, it is just as though there were "empty time" between them. Suppose such a time T to elapse. Why now should B follow A at the interval T? No reason can be alleged, except that T is itself a condition that must be added to A in order to give B. That is, time would be a condition of the production of a fact, which, according to our axioms, it is not. The same argument, be it noted, will apply to the shortest intervals as well as to the longest, whence there must not even be a momentary interval, but the process must be strictly continuous.² In fact, it is with causal as with all temporal succession—the idea of one event B following an event A involves a good deal of (mainly involuntary) abstraction. No event ever begins or ends; but a process goes on which passes gradually from one phase into another. We ticket prominent or clearly distinct phases with separate names, and speak of them as different events; but we must remember that, though in one sense they are different, there yet is no barrier. Hence the law of the ground gives us a hint for our conception of a cause as that which not

¹ If it be said that difference of position is itself difference of quality, we must answer that in that case the purport of our axiom is to debar that particular kind of quality from affecting a thing's antecedent or consequent.

² It might be objected that this argument applies when A is the true universal of B, but that a case may be imagined where it would fail. Suppose, for example, that A produces B by acting on M, i.e. together with M. Now, let M come into existence at an interval after A's disappearance. Then there would be a reason other than that of mere lapse of time why A's effect should take place now and not before. Let M as such have the effect β . Then, as shown above, the change which combined with β gives B must follow from A as such or not at all, and hence the present case really falls under that already treated, and A's consequent must be directly continuous with it, whether that consequent be a modification in the effect of some contiguous fact or stand by itself.

merely goes before the effect, but, as it continues, turns into the effect.¹

3. Another important application of the law of the ground is in what we may call the logic of consistency as applied in the moral and practical no less than in the purely intellectual sphere. Moral reasoning, for example, begins with the demand for a principle. What is good or bad must be good or bad as such, or else there must be some reason why,—some principle on which it is good or bad here and now. There must be some rule in the matter. If you cannot state the rule, still you feel that it is there, underlying the complexities from which you cannot disentangle it. Your only alternative is to give up reason altogether, and say that you cannot reason on such matters, or (what is more likely to be your plea) that they do not admit of reasoning. Even so, you only testify to the identity of reasoning with the assumption of universal rules. You cannot reason precisely because no such rules can be found.

In all practical, ethical, or æsthetic judgments the question Why? recurs until you can assign the fact from which your first assertion follows always. "This is good, bad, wise, foolish, beautiful, praiseworthy, deserving of the severest punishment." Why? is it always so? No. Then, why? You must answer this question, or you do not begin to give a reason for your assertion. If you cannot answer it, you may be a good judge,—practically, ethically, or æsthetically,—but you are a bad reasoner. If you want to explain, justify, or convince, you must have clear principles, that is, universals. The whole existence of law, all that is good and all that is bad in it, depends on this fact. Law exists because rational beings must deal with one another rationally, and to deal rationally is to act on fixed principles. Law is good, because rational action promotes social welfare; and law is bad, because it is impossible to construct rules to meet all the complexities of human life—it is *subtilitate vitæ humanæ longe impar*. The use of precedents and analogies is simply the same appeal to the universal put in the concrete for purposes of imaginative realisation, or to save the trouble of abstract expression, or because of some want of confidence in the actual justification of the general rule.

Lastly, a principle, used almost without comment by logicians, and employed in our last chapter, follows immediately from the axiom under discussion. So far we have been

¹ The conception of causation as a continuous process is admirably expressed by Mr. Bradley, *Logic*, iii. ii. 2, § 5.

insisting that every fact has its universal antecedent, something which cannot exist without giving rise to it. It is contained in this, that whatever a fact is justly attributed to in any case must give rise to it universally. If B here follows from A, then whenever we have A we shall find B. In a word, if B is true of A as such, it is true of it always. If this man is to be hanged, *quâ* murderer, then all murderers ought to be hanged. Here, then, we have the justification of a previous argument. We held, in Chapter IV., that the inference from minor to conclusion (from this A to this B) involved the major (A - B always); we now see that this inference follows immediately from the general axiom involved in all reasoning on practical matters, or in what has been called the logic of consistency.

CHAPTER IX

CRITICISMS OF THE THEORY OF GENERALISATION

1. So far we have seen our axioms applied to show that, if we are going to draw inferences at all, we must draw universal inferences. But can we go beyond this? Can we so apply the axioms as to show what are the universal inferences to be drawn? And in doing so, do we need nothing more than those activities of attention, construction, memory, and analysis of which we have already taken account? Can we, in short, from the observed facts that are here and now, or were there and then, arrive, by the application of our axioms, at truths holding universally for all time and space?

We must observe, first, that the abstract possibility of such an argument has been called in question. We have assumed throughout that we argue (*a*) from the particulars of experience (*b*) by their similarity. But, it will be said, this is a mere revival of Mill's argument from particulars to particulars, which has long ago been exploded. Let us, then, consider Mill's position in relation to our own and to that of Mill's critics.

Mill states his theory of inference as follows:—"We find it resolvable, in all cases, into the following elements: Certain individuals have a given attribute; an individual or individuals resemble the former in certain other attributes; therefore they resemble them also in the given attribute."¹ In this process the universal proposition does not necessarily figure as an explicit step, but it is implied. "Meanwhile, however, it is certain, as before remarked, that if this inference (that he is mortal) can be drawn as to Socrates, it can be drawn as to all others who resemble the observed individuals in the same attributes in which he resembles them; that is (to express the thing concisely) of all mankind. If, therefore, the argument be admissible in the case of Socrates, we are at liberty, once for all, to treat the possession

¹ *Logic*, bk. ii. chap. iii. § 7.

of the attributes of man as a mark, or satisfactory evidence, of the attribute of mortality. This we do by laying down the universal proposition, "All men are mortal," and interpreting this, as occasion arises, in its application to Socrates and others. By this means we establish a very convenient division of the entire logical operation into two steps: first, that of ascertaining what attributes are marks of mortality; and, secondly, whether any given individuals possess those marks. And it will generally be advisable, in our speculations on the reasoning process, to consider this double operation as in fact taking place, and all reasoning as carried on in the form into which it must necessarily be thrown to enable us to apply to it any test of its correct performance."¹

We have here a clear statement of the main essentials of much, if not all, inference. We have (1) certain given particulars, or individuals, which (2) present certain attributes in conjunction. This forms the ground or premises of inference. Then (3) this conjunction is expected to repeat itself in any fresh case resembling those given in the possession of one of the pair. And this may be all the explicit or conscious process. But this process implies (4) that a parallel conjunction is believed to hold universally; and so, in fact, we find (5) that the apparently single step of inference resolves itself into two—(a) the act of taking the given conjunction as evidence for universal conjunction, and (b) the application of this universal to a fresh case. A criticism might perhaps be made that Mill speaks of distinctions of steps as comparatively unimportant and accidental. It is not only "generally advisable to consider it as taking place," it is quite necessary to consider it as vital to the logic of the operation. Mill does not draw a clear enough line between the conscious process and its implications. The logic of the matter is really unvarying, and contains all the elements given by Mill, always and without exception, however much or however little an individual thinker may realise of the matter. The distinction, then, of the "two roads," "to the principles" and "from the principles," which Mill tends to minimise, is, for our view, cardinal and permanent. To arrive at the universal is already an inference; and the universal is a result interesting in itself. To apply the universal is a fresh inference. While, lastly, we may, so far as our conscious thought goes, obliterate the distinction, and argue straight from particular to particular; but, logically, in so doing we

¹ *Logic*, bk. ii. chap. iii. par. 7.

have committed ourselves to the universal judgment. With these reservations we may accept Mill's account.

2. Having recognised our substantial agreement with, and obligation to, Mill, we should scarcely be justified in passing on without noticing the objections which have been taken to the whole theory of the argument from particulars to particulars. Mr. Bradley¹ tells us that "to reason directly from particulars to particulars is wholly impossible." He proceeds to admit (§ 4) that, "when we go from experience of facts, this experience is the foundation of our inference; and, further, that "no explicit major" is required. But this, he tells us, is no proof that "we reason from particulars as such direct to particulars."

Since Mr. Bradley declines (§ 2) to directly examine Mill's chapter, it is not always easy to know what he means by the phrase which he is criticising. But Mill's view has, we have seen, an intelligible and an important meaning. It is therefore worth while to inquire how Mr. Bradley's criticisms affect the theory as Mill held it.

(a) Mr. Bradley first asks (§ 6) what particulars are intended as the premisses of the inference. "Particular images of past occurrences" are not, he says, available. But where, in Mill's statement or in any other, do we find anything about the use of particular images? We remember the past, and use the memory-judgment as a premiss in inference. And memory gives us the past as a particular fact, as a fact that once was given and occupied its own place in the memory-series. But a memory-judgment is not an image, and there is no question of images in the matter. I pass over Mr. Bradley's second argument, as resting also on his image-theory, and come (b) to his remark, that when the past event is "called to mind, and when we do argue from a particular image, yet even then we do not argue from its particularity, from its psychological environment and temporary colouring" (§ 8). Noting, as we pass, that Mr. Bradley seems here to admit, in certain cases, the "particular image" which he rejects *in toto* a few lines above, we may ask, What has the present argument to do with the case? Whose theory is being criticised? Who can have supposed that we argue from the particularity of a given fact in the sense of that which differentiates it from the case in hand? If anyone ever held that view, we certainly are not concerned to defend him. "We argue," says Mr. Bradley, "from the content, the idea which can exist in different times and under diverse psychological conditions."

¹ *Logic*, bk. ii. pt. ii. chap. ii. § 1.

This is surely a repetition, in somewhat looser phrase, of Mill's own view. A certain conjunction of attributes is found in a given case. We are given a fresh case, similar to the first in point of one of these attributes, and we infer a further similarity in point of the second also. Of course, the two cases differ in detail, and of course the gist of the whole argument is to dismiss this detail as irrelevant, and to assert the similarity in spite of it. When we can do this, and why we can do it with some conjunctions and not with others, it is the business of inductive logic to determine, if it can. But that we do it rightly or wrongly is the simple fact which forms its starting-point.

(c) Mr. Bradley's fourth remark, that we argue from a part of the given conjunction, is equally true and equally irrelevant as a criticism of the argument from particulars. No doubt we may, in fact, drop any part of the given conjunction and argue to one that is more abstract. And this may be justified in certain cases and not justified in others. But it does not affect the view that we argue in the first place from the given conjunction. It means only that we take some elements of that conjunction to be unessential to the conjunction of the others.

All this criticism may be entirely fatal to the theory of some writer or writers unknown. If intended for use against Mill, its complete irrelevance appears as soon as we compare it with Mill's own theory. By the argument in question he means, as he explains quite clearly, a process in which (a) a certain conjunction of attributes is given once or oftener, and (b) a fresh case is given resembling the former in one of these attributes. Our data are then, first, a given conjunction,—this is the particular which figures as premiss, particular as a specified given fact,—and, second, the resemblance of the new fact to the given fact. The "particularity" of the first fact, so far as it means that the first fact really was given in experience, is essential; so far as it means that the first fact differs qualitatively from the second, there is nowhere in Mill a word to indicate that it is used as a ground of inference. It may be an argument *against* the conclusion,—that depends on circumstances,—but there could be no idea of treating it as contributory to the proof of the conclusion.

This being understood, we shall not be surprised to find Mr. Bradley coming, in the end, to what is essentially Mill's position.

"But if we amend this semblance of reasoning and bring it to the form of a real inference,—if we say 'A, B, and C are

α , and therefore D, which resembles them, is α ,' we are no longer arguing from mere particulars. We are arguing from the resemblance, from a point or points which D has in common with A, B, and C. It is not because A, B, and C are α , but it is because in them some element β is α , and because, again, we find β in D, that we argue, 'therefore D is α .' For, whenever we reason from resemblance we reason from identity, from that which is the same in several particulars and is itself not a particular. And is it not obvious that in arguing from particular cases we leave out some of the differences, and that we could not argue if we did not leave them out? Is it not then palpable that, when the differences are disregarded, the residue is an universal?"¹

And is it not obvious, we may add, that the argument from resemblance is precisely Mill's theory? And is it not palpable that, when cases resemble one another in "certain points," and we argue upon that ground, the differences are left out? Is it not clear that Mill's whole system of induction is an endeavour to determine the conditions under which it is safe to "leave out" differences? And does not Mr. Bradley himself take objection to Mill's favourite method, as going too far in this very direction;—has he not nicknamed it "the method which shuts its eyes to differences"?

To put it briefly, Mill says you argue from a given case to one which resembles it. Mr. Bradley says no, you argue from the universal or the common quality. But what is this quality? It is that which appears in both cases. That is, it is the point of resemblance between them.²

But, says Mr. Bradley, the resemblance is not a particular. True; but it is a relation between two particulars, and the theory is that it is just this relation that enables us to argue from one particular to another. But perhaps Mr. Bradley will say again, it is not a relation but an actual identical element in the two cases. If this is intended, we must know what it means. Does it mean (α) that the cases A and D are

¹ *Loc. cit.* § 12.

² It may be objected here that at least the phrase "from particulars" ought to be given up, since we argue really from the resemblance. The point is not important, since the question really is what Mill meant by the phrase, and whether, as he meant it, it was justified. But we may add this much, we argue from the particular because the given instance is the starting point of our whole process. We argue directly to the fresh particular in Mill's sense whenever we do not make an explicit universal judgment. That we argue directly in the sense of submitting the particulars to no operations of thought such as analysis and comparison, so far from being Mill's view, is incompatible with his whole statement. We might perhaps qualify Mill's phrase by saying that we argue from particulars on the basis of resemblance to a fresh particular implying a universal.

alike, not as wholes, but only as containing the elements $\beta\beta$. If so, of course it is from β that we argue. We found $\beta - \alpha$ in case A. We find β and infer α in case D. Now these two instances of β are "identical," in the sense of exactly resembling one another, and this exact resemblance is the basis of argument. But here we still have a relation of resemblance as the basis of argument. But (b) is it meant that the β of A and the β of D are identical in any other sense? If so, we must have that sense produced and made intelligible before we can criticise it. Lastly, in both cases β is a particular in Mill's sense. It stands in unique relations and is a given fact of observation. And when (to conclude) it, as a particular, is said to be a basis for argument to other cases, what is meant is precisely that, though given in this or that instance only and in each case in unique relations, we can, under certain circumstances, treat those relations as irrelevant, and argue that in other instances in which an element resembling β is found other elements will attend upon it similar to the α found in the instance before us.¹ In the objections to this account two meanings of the particular have been confused. The particular is (a) the qualitatively peculiar and (b) the observed given instance. That we argue from the peculiarity of a datum no one contends; that we argue from elements of the given is directly implied in Mill's statement: but that we argue from that which is observed in this case and in that is a position in no way shaken by these reflections. The discovery of the "element" depends on analysis of the given; the belief in its connection with another element depends on observation of it in given instances, and is assured only when we are satisfied that the remaining characters of

¹ Mr. Bosanquet, in dealing with the argument from particulars, falls apparently into the same misconception of Mill's position. In inference from particulars to particulars, he says: "There is apt to be, at first sight, nothing at all which binds these particulars together. The pervading identity or universal, which we affirm to be the operative power in inference, often appears in popular practice, as in Mill's theory, to be simply non-existent." This may be true of popular practice, but is a very inadequate statement of Mill's theory. If by the universal Mr. Bosanquet means the common attribute, the points of resemblance, these are expressly provided for in Mill's theory as the basis of the whole matter. If he means anything else, I should be prepared to find the error on his side rather than on Mill's.

Jevons (*Principles of Science*, bk. v. chap. xxviii), after stating that "the fundamental process of reasoning consists in inferring of anything what we know of similar objects," proceeds to tell us, that "no one who holds the doctrine that reasoning may be from particulars to particulars can be supposed to have the most rudimentary notion of what constitutes reasoning and science." We can only reply that no one who makes these two statements within two pages can be supposed to have the most rudimentary notion of his own meaning.

the particular—its particularity in this sense—may vary without prejudice to the conjunction in question.

3 Admitting the general possibility of arguing from the particular case, it may still be questioned whether the principle here formulated is that on which such argument really proceeds. Lotze—whose broad statement of the nature of argument from the single case leaves little to be desired in vigour and clearness—appears to suggest that the principle used is that of identity. Given that the subject and predicate which we are connecting are appropriately selected, i.e. that they are really relevant to one another, and that nothing is left out which is essential to the connection, then "the law of identity guarantees that if the same S were once more perceived in a second experience it would be impossible that the same predicate P should be absent or should be replaced by some other predicate Q."¹ But there seems a twofold confusion here. To begin with, it is not a question of the same S in another case, but of a precisely similar S. And, secondly, the law of identity, as formulated by Lotze himself (bk. i. chap. ii. § 55), can never assure us that S is P, but only that S is S, P is P, S - P is S - P, or any other tautology you please. The real question is, How do you know that this S being P that S also will have P? how do you know that the second case resembling the first in one point will resemble it in another? It helps you not a whit to substitute identity for resemblance. Say, if you please, that resemblance is partial identity. These two cases are identical *quoad* S. Will they also be identical in P? Your formula cannot possibly decide. These two animals are so far identical that both are mammals (S). Then they are also identical in being viviparous (P), but not in being ruminants (Q). Why does the identity S carry the further identity P and not Q? The principle of identity will not help you to determine any better than the principle of similarity.² To be of use it will have to undergo a complex development parallel to that which we have applied to the similarity principle.

The truth is that, as Lotze himself has ably shown (bk. i. chap. ii. § 64), the principle of identity cannot really be a

¹ Lotze, bk. ii. chap. vii. § 252, Eng. trans. 1st ed. p. 299.

² If it were answered that S will be Q in both cases, if S is really identical I should reply: 'No! If S is a particular feature of the whole compared distinct from Q, this is false. There may be true partial identity without complete identity. But if in it is meant that S must be the whole character of the individual, in which Q is already included, the whole argument falls to a barren tautology. S is Q because S is known to be Q and something more. Lotze certainly did not mean anything so trivial as this.

source of knowledge. It is the principle of sufficient reason, as Lotze calls it, by which we really work. And the confusion seems to have arisen from an idea that this principle, after all, states a kind of identity (see § 63). But this kind of identity, we must again protest, is a different kind. When the ground and its consequences are events in time there is an identity between them, but the identity not of perfectly similar character but of continuity of process. Ground and consequence are the same only as belonging to the same whole. When there is a time relation between them, it is true that the one *becomes* the other,¹ it is not true that the one is the other. They form parts of one process, but in that process they are distinguishable phases. We shall return to this subject later, only remarking here that the principle of inductive reasoning, however formulated, must provide for (a) the distinctness of ground and consequent and (b) the numerical separateness of the cases to which it is applied.

But if the abstract possibility of reasoning from particulars is admitted, and if it is granted, further, that we have correctly formulated its principles, the practical difficulties of such reasoning are obvious, and that whichever of our principles we employ. If we use the axiom that every event must have its universal ground, and that if that ground is not in this fact it is in some other, this may give us a hypothetical certainty, but does not show us how we are to exhaust all possible grounds as to get down to one and one only. If we go back to the position that any observed sequence may be generalised, if nothing in our observation makes a difference to it, we are met by an almost equal difficulty,—for how wide is that observation to be? Confining our attention to this or that sphere, a certain sequence is uniform, while a wider view proves it to be irregular. This throws doubt on sequences in themselves unexceptionable. If some supposed uniformities have cheated us, why not others? Again, in this argument, from "some" we seem to come upon a new kind of premiss which demands attention—the premiss, namely, of a partial or probable argument. And here we have come back again to the starting-point of our present inquiry, for we began

¹ Accordingly, Rühl (*Der Philosophische Kriticismus*, II, 1, p. 233, etc.) traces causality to the principle of synthetic identity—"What is *permanens*." In some sense, doubtless, this is true. But how far things *persist*, and how far they *change*, the principle does not tell us. It cannot, therefore, serve as a principle of inference unless, as we shall see later, it is limited and defined by deduction from the law of causation. It is, therefore, not a self-evident but a derivative law, and a *locus* one to boot. Once for all, the principle of identity cannot play both parts. Either it is an incontrovertible tautology, or it means something and then is no longer self-evident.

with partial consideration—arguments from mere likeness or difference. Combining these, we thought that certainty might be found; and we have so far succeeded as to reach certain axioms which we can hold provisionally; but in applying these axioms to the phenomena of reality, so as to get at some notion of their order and connections, and turn our abstract knowledge into concrete, it is clear we shall have difficulty. In order to understand these difficulties and overcome them, we must understand how the various conflicting considerations with which we have to deal can be weighed against one another. That is to say, we must determine the value of a partial or incomplete reason for a conclusion, or, in other words, we must deal with the question of probable reasoning.

CHAPTER X

PROBABLE REASONING AND ANALOGY

1. ON many logical theories the word "probable" has a sort of dissolving effect. As soon as we have uttered it we are held to have removed ourselves from the region of exact results and rigid tests, and to have retired to the land of vague expectations, for which, according to some, no reason can be given, and, according to others, no reason need be given. We expect; we believe; our opinions or convictions have a certain strength; this strength has something to do with the number of instances we have observed, or perhaps with a hypothesis we have framed, but there need be no question of a test for anything so indefinite. And this treatment is extended to inductive reasoning. When difficulties are found in treating it as rigid demonstration, it is ticketed as "merely" probable, and then handed over to vagueness and indecision. From the probable to the fallacious is for some thinkers only a step, and so induction is converted, for example, into a kind of bad deduction. A flaw is supposed in its first principles, and yet it is held to give results, even perhaps good results. It is treated as a basis for the generalisations with which deductive reasoning starts,—a treatment which would make the greater part of deduction futile. Some thinkers, again, like the followers of Hume, while insisting with Bishop Butler that probability is the guide of human life, think it sufficient to point out that inductive conclusions are in fact brought about by certain alleged psychological laws without inquiring what basis, in truth or reason, this probability may have.

This treatment plays fast and loose with the conceptions both of probability and of induction. If there is probability, it must have a definite degree and a rational ground. Probability may or may not be a mere attribute of my personal belief,—we shall inquire into this immediately,—but this is certain, that it either is warranted or unwarranted. If warranted, then there must be some ground in reason for it which justifies precisely

such and such a degree of probability, no more and no less. If it is not warranted, then let us abandon an ambiguous word and speak not of probable but of firm and lively beliefs. The admission that induction is merely probable will then wear a different face; it would amount to this, that the strongest induction merely produces lively convictions. This, in fact, is the view consistently adhered to by Hume, but it will be obvious at once that it goes a good deal beyond the admission that the certainty warranted by induction is not absolute.

On the whole of this question more precision is required. Either induction proves something or it proves nothing. If it is essentially fallacious it can prove nothing. We have all heard of syllogisms in which the premisses are false and the conclusion true, but who would knowingly rely on such an argument? Whatever argument proves any conclusion must prove it logically. Hence, whether induction proves a certain or probable conclusion, its method must be such as to give true and just ground for a certain or probable result. Granting, for the sake of argument, that we can never get certainty from induction, it still remains to ask how we get probability; and whatever our answer may be, we may deny *a priori* that we can get a probable result, or any result at all, from a method that is radically unsound.

The question of probable reasoning would have been treated with more ceremony had an important point been more constantly kept in mind—I mean the affinity between probability and certainty. We have already seen reason to accept Hume's view of belief as differing from the entertainment of an idea only in intensity of conviction. Much clearer is the relation between different kinds of belief. As we pass from doubt to well-established conviction, the mental state—regarded in its full psychological concreteness, with its tones of feeling and its shreds of association hanging about it—may very likely undergo certain qualitative changes. But looking at the logic of the case, that is to say, the relation between the asserting consciousness and the object asserted, we must admit that the content is the same, while the difference is one expressed by the words certainty or strength of belief—words expressing a characteristic of modes of consciousness that is, so far as I know, unanalysable. So far, looking at the thing from the purely subjective point of view (*i.e.* regarding only the content of the asserting consciousness at the moment of assertion), we conclude that certainty is merely the limiting case of strong or "lively" belief in the one direction, pure doubt being the limit at the other extreme.

Now, just as full certainty has or may have its rational ground, so also may lower degrees of belief, and to this ground the term "probable" has reference. "What you think is very probable" expresses the judgment of one mind on the opinion of another. Again, "Nothing happens but the unexpected," or the "most improbable combination occurred," suggest no longer degrees of actual belief, but some characteristic either of things themselves or of their relation to the average mind. It might be urged in reply, that in these cases we put ourselves imaginatively in the place of a person expecting such an event. Even this would prove that there are certain fairly well understood ways in which judgments of probability are formed. And lastly, frequent criticisms show not only that probable judgments are formed regularly in conformity with constant psychological laws, but that we demand that they should be so formed. A "wildly improbable" judgment is as unreasonable and logically blameworthy as a contradiction or a fallacious deduction. If there is a difference it is only one of degree, and it is not a great difference of degree. Now, it may be denied that the term reasonable has any distinct meaning. But if so, the denial must be applied all round. Reasonable and unreasonable, logical and illogical, may be sounds signifying nothing, or may merely express certain common ways of believing or forming beliefs. There may be no standard of appeal. But this is a question that must be discussed separately on its own merits, and with reference to the total meaning of "reason" in all its applications. All we have to note here is the general assumption that there is a *reasonable probability*, just as there is a reasonable certainty or a reasonable deduction. That is the common belief, right or wrong, and that being so, it is our business to ask what consistent account can be given of reasonable probability. What is reasonably probable, and why? ¹

2. Our general answer to this question is determined by the simple reflection, that the object of the reason in matters of knowledge is to attain truth, the object of reasoning to get correct results. Then, if the results of any method are incorrect, the method itself stands condemned. Conversely, good results increase our confidence in the means by which we obtain them. The true criterion of the reasonable, then, is the actual conformity of its conclusions with fact; while conversely, that which does not lead us to conformity with fact can have no claim to be considered reasonable. Now, conformity to

That probability is the measure of what ought to be believed is well argued by Jevons (*Principles of Science*, bk. ii. chap. x. ad init.).

fact is, at first sight, a very clear and definite conception, as distinct from error as light from darkness. And were reality and knowledge so constituted as to admit of no intermediate condition between full knowledge and none at all, the contrast in all its simplicity and absoluteness would hold good, and the first word upon the subject would be the last. But though light and dark remain for ever contrasted, there are degrees of light that come between: and so, though doubt is never certainty nor error truth, there are stages of belief in every gradation between certainty and doubt, containing admixtures of truth and error in every proportion; and this for the simple reason that the grounds of a truth are not all discovered at once, but are revealed to the inquirer bit by bit. If this is so, logic, as an attempt to criticize knowledge, must deal with probable as with demonstrative reasoning. It is in every case the object of the reasonable man to find and occupy the right mental attitude to the world in which he is placed. The attitude is obvious enough where knowledge is complete. Where knowledge is partial it becomes more complicated and difficult, and with these complications and difficulties the logic of probability has to deal. Briefly, we may put it that the object of reason in employing partial knowledge is (α) to form conclusions which, without being always true, will approximate to truth more nearly than any others,¹ and (β) with regard to any given conclusion to maintain that state of belief which will serve it best relatively to other considerations, speculative or practical. A general principle of probable reasoning is valid if, as a general principle, it effects these results; and the logic of probability has to deal with such general principles and show their validity.

A probable conclusion, then, is one which is not merely held, as a matter of psychological fact, with a certain degree of felt conviction; it is one which ought to be so held: that is to say, it is held on grounds which, on the above principles, justify such a degree of belief, no more and no less. It must rest, accordingly, (α) on certain known facts, and (β) on certain methods of forming further conclusions from those facts. So far it resembles a demonstrated belief; the only difference being that the facts known are not, by the methods employed, sufficient to give a certain result. Our immediate object, then,

¹ I need hardly add that the view to which we might be tempted *a priori*, that *ahner* doubt is the only reasonable attitude in the absence of rigid demonstration, is barred by this formula. If by use of a probable argument I am right ten times and wrong once, I am far nearer truth than if I remain in doubt all along.

is to point out the sort of facts and methods giving results of this kind.¹

3. We have already dealt with certain kinds of partial or incomplete grounds for generalisation. In fact, our theory of sufficient or complete grounds was formed by a synthesis of considerations of that kind. These grounds therefore form our point of departure for the theory of probability as well as that of certain proof. Any observed uniform relation, then, is a possible basis for generalisation; that is to say, it is a ground which, in the absence of any reasons to the contrary, becomes conclusive. This would all be very easy and pleasant,—so easy that there would be no need for a theory of probability,—if it were not that experience is constantly presenting us with reasons to the contrary of all manner of generalisations from observed facts. That any given relation $A - B$ taken at random will be repeated is an expectation which is defeated as often as not, or rather we should say, far more often than not. In every such case, of course, there must be changes in the concomitant facts, but the only deduction we draw from that is that such changes must be very common things, and that an argument is not worth much unless we take them into account. The argument, in fact, though common is contemptible. An Oxford professor was said to have derived all his "knowledge" of the working-classes from a hasty generalisation from his "scout." In the same way, a locked-out miner hits another miner on the head, and the press rings with the violence and intimidation on which the new unionism is based. A stray dog howls through a village, and six months afterwards somebody dies, whereupon stray dogs are regarded as "uncanny," and so on *ad infinitum*.

Thus if an observed parallel case is a consideration it does not seem a very strong one as it stands, and we may see already that the process of propping it up will mainly consist in eliminating the concomitants which may so often "make a difference." But before we turn our attention to this side of the matter, let us notice certain consequences of the positions now laid down. These last are—(1) that any point A in a given set of facts associated by past experience with B is *pro tanto* a consideration in favour of the presence of B in this case; (2) that such a consideration as it stands is weak; but (3) that if

¹ A "probable fact" has sometimes a third meaning, in which it is applied to an actual known reality. Thus an event depending on an extraordinary and unusual conjunction of conditions is sometimes thought of as intrinsically improbable, and so remaining so although it has happened. We shall see that in this sense the probable ultimately means the frequent, and therefore had better be called by that name.

the whole set of facts resembled a past set which had B, or resembled it in every particular except such as were proved irrelevant, then B would be certain. Now suppose that the relation $A \rightarrow B$ were certain, so that the whole $A \rightarrow B$ was of itself a sufficient ground for the inference B. Then what of the ground A by itself? By our first rule we should hold A a ground for expecting B. By the same rule any fresh points of resemblance, C and D, are equally considerations in favour of the same conclusion. Similarly, any points of difference, X and Y, are considerations against it. Hence if the points of resemblance outnumber those of difference we have more considerations for than against the conclusion; and conversely. If, further, we count every distinguishable *degree* of resemblance as a distinct "point" we may say broadly that the probability of $A \rightarrow B$ will be inversely as the magnitude of X; that is, the more A resembles A X, the less the difference X is, the more likely it becomes that the two antecedents will agree in a given element B of their consequents.¹ Thus the numerous points of identity between lightning and the electric spark pointed to a common nature; and Franklin's experiments, which consisted in showing further points of resemblance, were taken as "establishing" the identity of the two phenomena, from which the agreement of their consequents in any given respect would follow.² Thus where complete similarity to a given antecedent is a certain ground for argument, there approximate similarity is a probable ground, and more generally partial similarity a partial ground. Or again, symbolising, if I have $(\alpha + \beta + \gamma + \delta) \rightarrow B$, and in a new case observe successively $\alpha, \beta, \gamma, \delta$ my belief that B will follow rises from a slender expectation through probability to the stage of demonstration. At the first symptom of an illness you think it just worth while to make sure that there is no other. At the second you feel uneasy, at the third you become prepared for the fourth or fifth, which when found remove all doubt.

On the one hand, then, each element of likeness between a

¹ It might be said that it is impossible that A and A X should both have B. But we are not assuming B to be the whole consequent of either. Perhaps it may be said that the most probable result is that A will have, not B but a modification of it, B V. We are, however, asking merely the probability of B.

² Cf. Professor Silvanus Thompson's *Elementary Electricity*, ed. 1895, p. 317. The list of points of agreement which he gives as enumerated by Franklin is instructive. Indirect effects like the smell, direct sensible appearances (i.e. colour and form), are ranged side by side with magnetic properties. As we urge in the text, in the rudimentary state of knowledge in which arguments of this kind are used, any point of resemblance, or of difference, is important,—we might say equally important.

given case and a known ground is *pro tanto*, in the absence of other knowledge, a consideration in favour of the consequent. On the other hand, every difference is a counter consideration. The balance of the two gives us a degree of probability which is thus dependent on the degree of likeness. But this rule, we need hardly say, is subject to constant revision. A striking and obvious similarity may prove immaterial, a barely perceptible difference may turn out essential—either point being readily proved by the negative instance. And we could perhaps hardly find any sphere of reality within the purview of thought in which our knowledge is so entire a blank as to justify an argument from crude degree of similarity as judged by our first perceptions. But, once more, if one point of similarity or difference is taken as intrinsically of greater weight than another, this can only be on some ground of experience of its behaviour.¹ In the absence of such experience we can only go by the proportion of the total similarity to the total difference as we find them. And in such case this proportion seems to be actually, and justifiably, used as a ground of inference, though it is not a ground on which very firm reliance could be placed.

¹ Mr Bosanquet's remark, that points of resemblance must not be counted but weighed, states an obvious truth. Of course, you must weigh them if you can. But the question is what you are to do if you cannot? And then, as I have contended, you must be guided by perceived degree of resemblance. But, again urges Mr Bosanquet, you cannot go by points of identity, for what is one point of identity? This is a weighty objection, but not final. If you cannot find points of identity, of course you cannot go by them; but if you can, you can. To put it more constructively; if the degree of resemblance strikes you as definitely greater than the degree of difference, then you can argue with some low degree of probability. Of course, (a) if you are not struck by such a ratio of degrees you cannot argue from it, and (b) even if you are struck, you may be quite wrong. We do not pretend here to have got beyond the first faint beginnings of probability. If, lastly, analysing the degree of resemblance and difference you can find units that strike you as bearing an equal relation to the total under consideration, you can estimate greater probability numerically, and it will increase in *some* proportion to the points of resemblance as numbered. All this is weak enough, and meant to be so. But it seems to be an argument actually used, and in its weak degree justified. We shall see later that the part played by persistent identity of content in our inductions makes the function of partial resemblance more important in certain cases. Also, the very weakness of the argument in its lower grades is a point on which afterwards we shall have to lay stress. (See Mill, *Logic*, bk. iii. chap. xx.; and Bosanquet, *Logic*, bk. ii. chap. iii.)

CHAPTER XI

NUMERICAL PROBABILITY

For higher degrees of probability we must turn to another form of inference which starts from a very simple idea. If you throw a die, and know of no reason why it should fall with any one side uppermost rather than any other, then the chances are said to favour each of the sides equally. Hence that fall which brings the ace uppermost represents only one out of six cases, all of which are equally possible. Hence the probability of the ace turning up is said to be $\frac{1}{6}$ of the whole range of probabilities. Now, if we take the fact that the die will fall as certain, and represent certainty by 1, the probability of an ace will be represented by the fraction $\frac{1}{6}$ (there being six equally possible ways in which the certain event may take place). From this assumption follow the whole mathematics of chance. If we throw two dice (instead of one), there are thirty-six possible combinations, and hence the chance of aces is $\frac{1}{36}$. On the other hand, there are six ways in which we may throw doubles, and hence the chance of such a throw is $\frac{6}{36} = \frac{1}{6}$. Thus the rule is that the probability of any event is to be expressed by a fraction in which the numerator gives the number of known contingencies in which the event will take place, and the denominator the total number of equally possible alternatives. Now our question is, What does the original assumption mean? What is meant by saying that the chances are equal, or that the probability of one event M is $\frac{1}{6}$ and that of another N $\frac{1}{36}$?

1. On this point an important suggestion has been put forward by Mr. Bosanquet. According to him the judgment of probability states a definite and definitely ascertained fact; it tells us not, of course, that M or N will be or will not be, nor yet that M will exist so many times and N so many, but that we have certain grounds X, positively known, for asserting M and certain grounds Y for asserting N. It can also inform us that

X is as strong a ground as Y, or that it is stronger or weaker, as the case may be.

Now, as a statement of fact I should be strongly inclined to accept the positive side of this view. The existence of a side stamped six on a die is in a certain sense a ground for supposing that that die when thrown will turn up a six. This can best be seen by comparing the case when we know that the die has a "six" side, (*a*) with the case when we know it has none, and can, in consequence, deny categorically that it will turn up a six, and (*b*) with the case when we do not know whether it has such a side or not. As against this last case, when we are informed that the die has the side in question, we have surely so far more reason for anticipating a throw of six than we had before. Similarly, in any given throw we have equal reason for expecting any one of the six sides to turn up, seeing that the conditions so far as known favour each side equally. Lastly, we may know that the conditions favour some particular combination more than others, and then, again, we have reason to expect that combination rather than the others.

But from this short statement a distinction will already be clear. That the probable judgment lays down grounds of existence cannot, I think, be doubted. That it also gives grounds of assertion I feel sure, but this is much more difficult to explain. The shape of the die, the conditions under which it is thrown, etc., are all clearly parts of the cause which actually results in its turning up a six. They are grounds, or, if you prefer it, factors in the ground of that event. Of course, they are not the whole ground, or there would be no doubt of the result. On the other hand, they are equally factors in the ground of all the other five possible events. Now, so far, the judgment of probability, dealing with certain alternative events, states, (*a*) that certain factors in the ground of each of them are known to exist; (*b*) that the factors known do not exhaust the ground of either; and (*c*) either that the factors known enter indifferently into the ground of either, or that they amount more nearly to the total ground of the one than of the other. So far we have a pure statement of fact, and, admitting that we have means of knowing what are the grounds of any event, or what are factors in such grounds, there is no special difficulty with regard to the probable judgment.

But, in fact, the probable judgment goes beyond this. It not only asserts grounds but it makes some kind of assertion with some degree of certainty as to the event itself. That is

to say, it takes ground of existence as being also ground of assertion. And this in a special way. Every universal judgment, and every deduction from an universal, bases an assertion on a ground known, or taken as known, of the existence of a fact or class of facts. But in ordinary cases the ground is a total ground, and the assertion is categorical. Here in the case of probability the ground is a *partial* ground, and the judgment in some degree doubtful. Here, then, we get the peculiar feature of probability. It takes a partial ground, or, as I have called it above, a factor in the total ground of the existence of an event, and makes it a ground for asserting that event in some qualified manner. Now, against this procedure no special reason can be alleged. It appears *prima facie* to be merely carrying out the dictates of reason over the whole sphere of inference, instead of leaving them confined to the narrow area where certainty reigns. We have no longer the absolute distinction of certainty and doubt. We are not left with only two alternatives—either the whole ground known or nothing to be said. But we have a regular gradation from the zero of doubt up step by step through the gradual filling of the ground, with probability increasing *pari passu*, to the complete certainty which rests on a known totality of conditions.

Such an extension of inference is plausible, and not inconsistent with any of the facts or characteristics of reasoning. It is, moreover, parallel with the assumption made in the first form of probable reasoning discussed. For there, too, it was assumed that the considerations of likeness and difference, which taken together give certainty, will taken singly give some partial degree of belief, and that proportionate to the considerations themselves. But now both these forms of probable reasoning have a test to stand—a test which is in itself a sufficient justification for accepting or rejecting them. We must ask, namely, whether the beliefs inferred from a probable argument satisfy the conditions of a reasonable state of mind as above explained, that is, in the long run approximate to truth more nearly than pure doubt or any belief formed on other methods.

2. To answer this question first with regard to our second form of probable reasoning, we must say that to expect an event as probable will be, within the terms of our definition, the most reasonable attitude—will bring us nearest to truth, and will suit the rest of our interests best—on one condition, that the expected event actually happens, not always, but most frequently.

If there are five instances of $A - B$ to one of $A - C$, it is clear that I am more likely to judge and act rightly if I anticipate B rather than C . It would be very foolish for me to play on the assumption that my enemy will throw a six next time. Nevertheless there is a chance ($\frac{1}{6}$) of C . Hence I must not be certain. That attitude of mind which would shut my eyes to any indications of C , or would make me think it superfluous to take any precautions against the "chance" of C , would be wrong. Five times out of six on a large average it would lead me right, but once out of six times it would take me wrong. Thus the required attitude is a combination of boldness and caution, and that is expressed as nearly as can be by the confidence which would correspond to a probability of $\frac{5}{6}$. Lastly, though exact measurement may be futile, we must admit that boldness decreases and caution grows, or should grow, according as the probabilities, mathematically expressed, diminish. Where the probabilities are $\frac{5}{6}$ I must be more careful than before. I must consider the risks of failure more closely, and balance them against the fruits of success. With five trumps I am pretty sure of overholding my opponents, but not as sure as if I had six.

I conclude from the maxims of life, and especially of those pursuits in which skill has to take advantage of the turns of chance, from the general conformity of conduct to those maxims, and from the practical success of such conformity, that the laws of probability are reasonable in that they lead to conclusions more closely in conformity with fact than such as we should arrive at by disregarding them. And this is very easily explained if we give to the law the meaning assigned above. If equally probable events happen in a long series of trials an equal number of times, we shall on the whole be more right than wrong by anticipating them equally. Still more clearly, if $A - B$ happens five times out of six, I shall be right five times out of six if I anticipate $A - B$; and it is better for me to be right so often than to be wrong as often as not. Thus, assuming this meaning, the rationality of the law is explained.

It appears, then, that the probable judgment regarding individuals is based, not immediately on the summation of partial grounds, but indirectly on that postulate which is at the basis of all our logic, namely, that the aim of the mind is at all times, and in all cases, to get and keep as near to truth as possible, in combination with the establishment of a certain average frequency for certain cycles of events.

3. It is, then, virtually this average frequency which the law

of probability lays down. If "the chances" of A and B are equal, then their frequency must be equal. And it will be on the meaning and justification of this statement that our theory of probable inference must turn.

But here an objection will be raised. We are wanting, it will be said, to know that which is *ex hypothesi* unknown. Chance is only an expression for our ignorance. When I say that the chances of turning up a spade or a club are equal, what I mean is, that I do not know what is determining the position of the cards. As a matter of fact whichever card is at the bottom of the pack, got there in accordance with universal laws, and any one who knew *all* about the antecedents at any stage, could have predicted the trump card. There are no alternatives in nature. There are only suggestions of alternatives in ignorant individual minds. The chances of a spade and a club in this deal neither are nor at any point were really equal, but the one was determined on by nature all along. When I speak of them as equally probable, then, I mean that I know nothing about the matter.

The conclusion here goes beyond its premisses. Grant, for the sake of argument, that every event and every collocation of events, from the motion of the earth to a throw of sixes, has its antecedent from which it necessarily follows by an uniform continuous sequence, still this does not exclude variability from nature. Each stream of causation, we may put it, flows on uninterrupted, inexorably and without shadow of turning; but at every point it is met by other streams, some of which mingle with it in a common onward flow, while others bend towards it and then deflect again. Let us symbolise for a moment two such streams by a series of letters:

A	α
B	β
C	γ
D	δ
E	ϵ

In these series we suppose each letter to be the universal ground of that which follows it. Given A we must have B, given B, C, and so on. Similarly with α , β , etc. Now, if you ask me the cause of any event in either series, as D, I can assign it—it is C, and nothing but C. If, again, you ask me for the ground of D and δ , I give it you in C and γ ; and if you ask me the cause of the collocation D- δ , it will be found in the preceding collocation C- γ . Now the relation C-D is universal; so is the relation γ - δ ; so again is the relation (C- γ)-(D- δ). Thus our theory of universals is satisfied,

each event considered, the whole $D-\delta$ and its parts D and δ , have their universal antecedents. But there is nothing to show that the collocation $C-\gamma$ is an invariable collocation. On the contrary, the evidence is against such a view.¹ If $D-\delta$ is variable, so may $C-\gamma$ be. And if $C-\gamma$, so $B-\beta$. Hence there is nothing to show that a variable collocation has not got variable antecedents *ad infinitum*. The postulates of reasoning do not resolve all variability into uniform necessity. Hence, however much we knew of the causes of any given event, we might be referred back only to collocations themselves variable, and which we should have to take as given before we could forecast the effect in question. We may again symbolise this by two streams or strings of events. We have—

(1)	A	α	(2)	A	μ
	B	β		B	ν
	C	γ		C	σ
	D	δ		D	π
	E	ϵ		E	ρ

Then why do we have in (1) $D-\delta$, and in (2) $D-\pi$? Because in (1) we had $C-\gamma$ and in (2) $C-\sigma$. The one variable collocation is explained by the other; and however far back you go, there is no reason why this explanation should not be repeated.

Still it may appear that variability, if incapable of elimination, remains a mere surd in our reasoning. The variable collocations must be precisely those of which we can never know anything *a priori*; and to base any positive statements on a theory of chance is simply to rest knowledge upon ignorance.

It is quite clear, so long as things vary and the conditions of variation remain unknown, that we can make no universal assertion about them. But the question is, whether the law of chances—to retain that name for it—does not just express certain conditions of variation which we do know, and which hold for variation in general. I think it does, and I shall try to show what it states, and to make it clear that we have certain definite grounds for the statement. If we put the law in terms, not of subjective expectation, but of certain characteristics of actual occurrences, a probability of $\frac{1}{2}$ would mean the fact, that if you take a large number of cases the collocation considered would be found to exist in approximately $\frac{1}{2}$ of the whole number. Things that are equally

¹ Conclusively so, unless we assert the plurality of causes. $C-\gamma$ could only be universal and $D-\delta$ variable if we admitted different possible causes for D or δ .

probable mean things that, in a large number of instances, are found an approximately equal number of times.¹ Conversely, if A is more probable than B, this means that A will be found oftener than B. If A is twice as probable as B, it means that A will be found twice as often as B. Lastly, if A is more probable than B under certain circumstances C D, it means that, given C D in a number of instances, in those instances A will be found more frequently than B.

4. But here another difficulty may be raised. Your law in its present form is, we shall be told, either tautologous or false. You say the most probable thing happens oftenest; but what do you mean by the most probable? You can mean either (a) that which we expect most. In that case your law is palpably false. For instance, I know nothing of a given law of nature—say, the dependence of cholera on a given bacillus. Suppose I am asked whether the presence of that germ will or will not be followed by cholera, I can only answer that it is as likely as not. The matter is to me one of pure indifference (theoretically speaking). The chances, for all I can see, are equal. Then if our law were true, surely it should follow that cholera would follow on the presence of the germ precisely as often as not, which (supposing a real connection) is palpably absurd. Again, general considerations, based on the examination of numerous substances, would lead me to expect that water would diminish in bulk as it freezes. Therefore in nine cases out of ten it will do so. In fact, its bulk uniformly increases. Hence it is perfectly clear that what to you or me appears most probable does not of necessity happen oftenest. Then (b) probability must have an objective meaning. The thing which is to happen must be that which happens oftenest. In that case our law resolves itself into a tautology, and informs us, that that which oftenest occurs happens most frequently. We might get out of this by saying, that what has happened oftenest is likely to recur most frequently in future. But that is not always so. Suppose a fever to break out in a place nine summers out of ten, there is no likelihood of its recurrence after the place has been drained. Thus what has been will be only if there is no alteration in any material fact, and we still got no general rule.²

But there is another way of defining probability. Take a

¹ For a full statement, with a great diversity of applications, the reader is referred to Mr. Venn's *Logic of Chance*, chaps. i. and ii.

² Mr. Venn's view that the ratio of frequency is simply established by induction is no doubt true in a sense, but does not, as I think, take into account the impossibility of making such an induction without postulating certain laws of frequency or probability. Cf. *ibid.*, p. 314, note.

conjunction $M-N$. If there is "anything in" M which "explains this conjunction" we ask no more about it. We understand it and expect it again. It is not purely "casual." But what is meant by "something in" M ? It may be that M as such is always accompanied by N . Then we have the simplest form of universal relation. Or it may be that M , in conjunction with some fact P that is present here, is always followed or accompanied by N . If so, it will be the conjunction $M-P$ that requires "explanation," and the frequency of which will determine that of $M-N$. Once more, it may be not M at all but an antecedent of M , K , which produces N .¹ In that case, observe that if K and M are "convertible," the case is the same as though M itself were the determinant. But if K , M 's antecedent in this instance, is "made up" of H and J such that H is the true universal of M , and J the setting or context of H in this instance, then J may be the cause of N , and the relation will once more be variable. We might pursue these complications to any length, but what we have said will serve to show the manifold ways in which two events can be casually connected.

There is a further point. If such a connection is truly universal in all its stages, link by link, then the resulting relation is also universal, just as though it were immediate. But if K , the antecedent of M and N , is such that M and N follow from it but do not, taken separately, presuppose it, then the chain of universal connection breaks down. In this case, if K is compounded of H and J , which are in no way connected, then the consequents M and N are in no way connected, and we have a "casual" sequence all through. But there is an intermediate case. H as such may produce M , while H together with J is followed by N . Or again, H acting on G may produce M , and J together with G may necessitate N . In these cases, which again might be indefinitely complicated, there is a partial connection between M and N , since the antecedents of the one contribute to determining the other. In the first case H , in the second G , are conditions entering into the determination of both M and N , but in neither case are they the sole conditions. We may put it, that M and N are closely or remotely connected in proportion as the conditions leading to the one do or do not correspond with the conditions leading to the other: though there will be this limitation, that in estimating closeness of

¹ Or more strictly, " N in the given relation to M ." Throughout this discussion, when we speak of N "existing" or "being produced," we mean of course in such a relation.

connection we must take into account, not only the number of points G in which P (= say, HG the antecedent of M) and Q (= GJ the antecedent of N) are identical, but also the absolute frequency of the remaining factors H and J . If these are both very common, we shall find the connection $M-N$ common, and if rare, rare. Hence the rarest factor in the conditions is also the most important in determining the result. Hence closeness of connection depends (α) on the proportion of identical conditions, and (β) on the absolute frequency of those which do not coincide.¹

This being understood, it will be seen that the frequency of a collocation $M-N$ depends on two sets of conditions. These are, first, the absolute frequency of M and N themselves, or of some among their antecedent conditions; and second, the extent to which the conditions producing M coincide with those producing N . In short, according to this view, the frequency of $M-N$ depends on the frequency of M and N themselves, and on the nature or relation of their several antecedent conditions. Thus putting all that pertains to antecedents on the one side, and calling it degree of connection, and putting the absolute frequency of the conjoined facts on the other, the law of probabilities lays down, that given the frequency of the elements that of their conjunction depends on the degree of their connection. That is, taking two pairs of phenomena, M and N , M and O , the absolute frequency of N and O being equal, the number of instances of $M-N$ will exceed that of $M-O$ if the connection between $M-N$ is closer, and will fall short if the connection be less close, and will be equal if the connection is equally close or equally remota.

5. In its general form this law is not available for purposes

¹ We may put the cases diagrammatically thus (using the symbol $A \rightarrow B$ to denote that A is always followed or accompanied by B , and \curvearrowright to denote a variable relation)—

(1) $M \rightarrow N$

(2) $M \curvearrowright P$
 \downarrow
 N

(3) $M \curvearrowright N$

(4) $M \curvearrowright N$
 \curvearrowright
 $M \curvearrowright N$

(5) $M \curvearrowright N$

(6) $M \curvearrowright N$
 \curvearrowright
 $M \curvearrowright N$

of inference. To use it, we should have to know not only the frequency of N and O , but the extent to which their conditions coincide with those of M , and the absolute frequencies of those of their factors which do not coincide with those of M . But in one particular case the law becomes very simple, and by starting from this simple case we may deal with others which are more complex. For supposing M and its antecedents contain no conditions at all which would lead to N rather than O , or to O rather than N , all further inquiry into antecedents may be dispensed with, and, according to our law, the frequency of $M - N$ and $M - O$ will depend solely on the frequency of N and O themselves. This, then, is the law of probability in its ordinary and workable form: the frequency of a conjunction between elements in no way connected with one another¹ will be proportional to the frequency of those elements themselves.² The converse law is also applicable—if

¹ More strictly, in no specific way. M 's causes may contain conditions which go towards producing both N and O , but this for our purposes will be equivalent to "no connection at all." We need only that there should be no element leading to N and not to O .

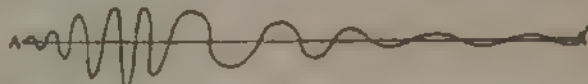
² Jevons' argument (*Principles of Science*, ii. 10), that probability can give no guidance to actual frequency, fails to distinguish two very different cases. (a) I may know very little about the degree of connection between two events. They may, in fact, be rigidly connected, wholly incompatible, or related in any other way. But, so far as my knowledge goes, it favours their conjunction as much as any other. Now here the true theory certainly does not assume that the rate of frequency can be known. But (b) without knowing all the conditions of two conjunctions we may know just this much, that the closeness of their connection is equal. Then the theory does say that the frequencies will be equal. And, conversely, as we shall see more fully later, if the observed frequencies are unequal, we deny that the degrees of connection can be alike. Jevons himself slides into this admission when narrating his own experiment with coins; he concludes, "The coincidence with theory is pretty close, but considering the large number of throws there is some reason to suspect a tendency in favour of heads." When I add that the actual figures were 10,368 heads instead of the calculated 10,240, we see that Jevons is influenced by so small a deviation as 128 in over 10,000 throws. Sigwart (*Lehrb.*, § 86) draws the distinction missed by Jevons, but rules the case of known equality of conditions out of the true theory of probabilities. But how in this case he gets at his process of reduction by which he argues from given frequency of combination to its most probable cause in the conditions which would most likely give it, I cannot understand. Grant that the conditions, if real, would most probably give that frequency, what we want to know is, whether that frequency most probably postulates those conditions. To be sure of this we must postulate that frequency depends on certain definite conditions, namely, closeness of connection or absolute frequency of the members conjoined. If we do not make such a postulate, I do not see how we can argue from the fact of frequency to any conclusion at all. Has not Sigwart been misled by his "reduction" theory, which involves the conversion of the hypothetical judgment?

In fact, at a later stage (§ 101), when dealing with reasoning from statistics, Sigwart distinctly lays down the principle for which we are contending (see esp. pp. 518, 519, vol. ii.). But if this principle is not the law of probability (and Sigwart still distinguishes it), on what does it rest?

the elements are equally frequent the degree of connection will be proportionate to the observed frequency of conjunction. That is, if $M - N$ is more common than $M - O$, either the antecedents of M and N have more in common than those of M and O , or the elements which they do not share in common are the more frequent factors in the conditions of N . How far this deduction is of value in inference we shall consider later.

But is it so? Toss a penny half a dozen times. Heads and tails are always "there," and what is there in the tossing to bring down one uppermost rather than the other? But are we bound to get three heads and three tails? Do we actually find the equality postulated? And if not in six instances, do we find it in ten or twenty or in how many? We must answer: (1) Exact correspondence is never expected, and may never take place; (2) approximate correspondence is not expected for small numbers, but (3) where the chances are really even, the actual numbers approximate to those calculated as the total number of instances taken increases. This statement may be formulated, that if in any series of trials the actual and the calculated numbers do not correspond, a larger series can be found in which they approximate more closely.¹ (4) For our own part, if we do not find this to be the case, we give up supposing the chances to be what we thought them. If, as

¹ It has been urged by Lotze (*Logic*, bk. ii chap. ix, § 286) and others, that the correspondence of calculated and actual frequency can never be "a real fact of observation," since it is only realized in the infinite series. Lotze adds, rightly enough, that if "in an experiment we reach a point at which the two numbers coincide . . . It would be a very arbitrary procedure to break off the series just at this point." But granting that exactitude could only be found at infinity, that is neither here nor there. We have said nothing about exactitude, but deal with approximations. And even as to these approximations we make only an approximate, i.e. a rough statement. I have tried in the text to make that statement as exact as possible. Another way of putting it would be, that the fluctuations of observed events about the calculated frequency can be expressed by some such a curve as below—



where the "trials" proceed from left to right, and the calculated number of "approximations" falls always in the line AA' . From what follows, it will appear ultimately that the approximation must be close for finite areas, if the conditions are given as equal for these areas.

Lotze's argument *loc. cit.* Eng. trans. § 286, that you cannot argue from experience to the permanence of the approximation, is accepted in the text. But we shall see later that, given the theory, we can argue from experienced frequency to a similar rate in other cases. How Lotze, while denying the theory, can tell us that the frequency of an event must have some kind of constant cause (see § 287), I cannot understand. The whole point of our

the result of 1000 trials, I threw sixes 56 times (i.e. about double the "right" number), I should infer pretty confidently that the dice were loaded. If I threw them 100 times I should be "sure" of it. If you ask me at what point I become sure, I can only say that you may as well ask me, like the old sophist, how many grains constitute a heap or how many times form a "lot." All I know is, that I "begin to suspect it" pretty soon, and my suspicion grows by slow degrees into certainty. It is a matter, not of definite certainty at any one point, but of a gradually growing strength of conviction.

6. Still, it may be urged, this does not answer the real question. Granting that the law of probabilities only exacts an approximate conformity to calculated results, and that even this conformity is only to be found over a wide area, and granting that such conformity is on the whole found in some instances, what proof have we that it will obtain in all? Granting, once more, that we for our part postulate it in all cases, it still does not appear that we are justified in doing so. It might even be urged that this argument involves us in a vicious circle, for if any given collocation does not correspond to our calculations we at once reverse our judgment about it. If $A - D$ is on a long series of trials more frequent than $A - C$ we conclude that the chances are not really equal in the two cases, but that A "favours" D . Hence the very instances that would negative our law are put out of court by our arbitrary assumptions.

There are, however, two possible ways of proving a general assumption. One is by enumeration of instances—and thus the law of chances would be proved by taking all, or some very large number of cases, and showing that the calculated results are verified in them all. This course is obviously impossible in our present case, and would undoubtedly involve the circle just suggested. In dozens of cases we should find that things which we set out by supposing indifferent to one another turned out to be very frequently conjoined. Such cases are *prima facie* exceptions to our rule; unless or until each one of them were disposed of by some quite different method of investigation, we should have to admit them as exceptions. In fact,

theory is that the frequency of a conjunction, like anything else, must be determined.

Stewart's argument (*Logic*, § 85) against Mr. Venn's admirable work is ingenious but scarcely fair. It is true that the calculated average will be *exactly* realised less often than it is approached, taking all cases of approximation together. This does not militate against the view that approximations will be realised, and that after any deviation the series will return towards the average. I should have thought Mr. Venn's statements on this point were sufficiently explicit (see, e.g., *Logic of Chance*, pp. 90-100, and in fact *passim*).

the general truth of the law of probability could not possibly be proved by observation until we knew everything about all manner of causal relations.

Another resource remains—that of connecting the present assumption with some other established principle. Such a principle we may for the present take the law of the ground to be. Not that that axiom may pass unchallenged. It will have to give some account of itself in its own turn later on. But for the moment it may content us that the said axiom is less likely to be challenged, and in fact (if our analysis is correct) it cannot be denied at all unless reason itself is rejected. If, then, we can connect the law of probability with this axiom we shall explain it, and justify those who hold it, and judge of things by it rather than of it by things.

According to this axiom, every fact must have an universal antecedent, in the widest sense of the word fact and of the word antecedent. Now, any given conjunction $A - B$ is a fact, and so again is the frequency of such a conjunction in a given area of reality. Such frequency, e.g. the repetition of so many wet days in a month, is as a single fact no doubt the result of a construction, but that does not exempt it from the necessity of following some universal antecedent. The same is true of comparative frequency; that, again, is a fact requiring explanation, as we recognise when we ask why there are more wet days in the West Riding than in Lincolnshire, or why there are more male births than female.

Now compare any two "indifferent" relations $A - B$ and $A - C$ in a given area of reality, and let the frequency of $A - B$ exceed that of $A - C$. What can be the cause of this? There are three alternatives. Either

1. The internal character of $A - B$ and $A - C$, which must be such that pairs of facts so characterised must always¹ obtain the given frequencies of conjunction;
2. Some external fact P favouring $A - B$;
3. The absolute frequency of B and C .

The absolute frequency being given, the question is between the character of the facts related and a possible outside cause. But the first of these alternatives is impossible. If neither A nor any of its antecedents is such as to produce B rather than C in any given case, how can they have this effect in a

¹ I.e., either in any area in which they are examined or in the universe as a whole. We shall see that only this second meaning can be actually fulfilled by other than universal relations. Merely "general" relations preserve the same proportion of coincidence in every area only under equally favourable circumstances.

plurality of cases? how can they account, then, for those cases by which the frequency of $A - B$ exceeds that of $A - C$? The supposition contradicts itself. If two conjunctions be indifferent, and one of them more frequent than the other, the cause cannot lie in the nature of the conjunctions themselves. It remains that the greater frequency of $A - B$ is due, not to A and B as such or universally, but to a third fact P . Then if P makes $A - B$ more frequent,—adds to its frequency,—it must clearly cause it either universally or in certain instances. That is, it must be an antecedent or part of an antecedent of A or B or the relation between them. Then take A as given, and we may have A in the presence of P producing B or bringing B into the given relation with itself. Or again, A may follow on K , and K be such as with P to produce B . In either case the frequency of $A - B$ will depend on the frequency of P ¹ when P is the single condition required. If more conditions Q R are required, the result will depend on the frequency of Q and R as well as P , but must in any case be less frequent than before, depending on the conjunction P Q R instead of P . Then the frequency of $A - B$ will depend on the closeness of their connection, as before defined, and our general "law of probability" is justified. If we know, by whatever method, that the "chances" are equal for B and C , we have a right to infer that they will be equally frequent. A converse application follows. From the facts of frequency we can argue to degree or nature of connection. For in any given area, i.e. in any number of instances or in any particular part of space or time, the frequency of $A - B$ must have its determining cause. And the frequency found must either be universal or it must be due to some P which favours B rather than C . Hence the variations in the frequency of a conjunction follow the variations in the other characters of different areas. And if no " P " can be assigned for the area given, we ought to generalise the rate of frequency for all areas.

7. But here an important distinction arises. P itself may be an expression for some single fact or for a collocation of circumstances. By a single fact I mean one which, whether simple or complex, is universally coherent, so that if we have

¹ For let Q give the contrary result ($A - C$) and be equally frequent; then by our first argument the combinations $K - P$ and $K - Q$ will be equally frequent. It might be said that P may be specially connected with K by some R ; but here, again, the same question will arise. $K - E$ will not be more frequent than $K - Q$, unless either R is more frequent or K contains conditions of R . In the first case, P will be more frequent than Q , which it is not; in the second, there will be a further link of connection between A and B , which we assumed there was not.

any one element of it we have all the rest. If P is of this character we have our single cause to which to refer the frequency of our conjunction. Thus, in an earlier instance, frequency of fever was explained by bad drainage, i.e. a single permanent set of facts which once begun continue of themselves, i.e. under certain negative conditions, universally. In such a case a variation is "explained," i.e. resolved into one of the known unvarying causal sequences.

But P may also, in its turn, be an expression for a certain individual collocation of facts, $\alpha \beta \gamma \delta \dots$ none of which determines another, but which have come together in this instance, and make up the individual character of the "area" under investigation. Thus, when we begin a game of backgammon, the dice are lying on the board in such and such a way; you take them up with such and such a movement, depending on this and that stimulus of sight or touch. This determines how you throw them into the caster; and they describe a curve in falling which determines how they are turned in the caster itself. Similar combinations infinitely subtle follow on, determining every step until the die is cast. Here, again, we have a combination of apparently disconnected facts, yet each with its own train of connections working upon one another.

This double possibility as to the character of P introduces a difficulty into probable arguments. At first sight it appeared that, if I found a certain rate of frequency for a given combination, I could either generalise that rate or lay down that some special cause existed in the area examined, determining it for that area. And this cause, at least if the variations in frequency were great, so that its operations would be on a large scale, ought not to be difficult to detect. But we now find that the cause in question may be no single fact on which we could at once lay our hand, but a concourse of disconnected events which come together here but perhaps nowhere else. How then are we to tell, in any case, whether such a "congeries of events" exists or not?

How far this difficulty can be surmounted in arguments from frequency we shall consider further in the next chapter. We may suggest here some considerations to which the theory already laid down would seem not unreasonably to lead us.

Take any conjunction $a-b$. We have shown that in the absence of a connection it depends on the frequency of a and b separately. Let it occur m times in a given area. Similarly, $b-c$ may occur n times. Clearly, either of these combinations must, if each be indifferent, exceed in number the more complex combination $a-b-c$. Similarly, $a-b-c$ will be more

frequent than any $a-b-c-d$. Hence, in the absence of any connection, the more complex combination is invariably less frequent (and, as calculation shows, very much less frequent) than the more simple. Hence, if a given result involves a complex combination of many antecedents, it will be rare. And conversely, if a given "casual" combination is frequent in a given area, it is more probably due to a "single" cause (as above defined) than to a combination of causes.¹ Thus the recurrence of a particular hand at whist is vastly improbable, owing to the great complexity of the circumstances which produce it. And conversely, should it recur, it is a lamentable, but probable inference, that a single human agency has produced it in both instances. It would require a very complex combination of undirected bumpings and rubbings to shape one piece of flint into an arrow-head, so that arrow-head flints so formed would be rare. And conversely, if many are found together, the probabilities are great that all the rubbings and bumpings that produced them were due to a single connected cause.

Lastly, if a collocation C is operative in a given area, the more complex it is the less frequently will it recur in other areas as well. If the conditions are really equal, it will, in some other area, give place to r , which results in $a-c$ instead of $a-b$. And hence, over many distinct areas, equal conditions will produce equal frequency. The same holds in theory of a single disturbing cause P , but we shall presently notice a practical difficulty in applying the theory in this particular.

If, then, we are comparing conjunctions for which the con-

¹ We cannot here enter into details with regard to the degree of probability assignable to the inference, but we may remark—(1) supposing our choice to be between two hypotheses to account for the abnormal frequency of a combination, the first involving a single, the second a combination of n causes; and assuming, further, that a cause of the combination is as likely to occur as not,

then the first case is more probable than the second, in the ratio of $\frac{1}{2}$ to $\frac{1}{2^n}$;

but (2) this second assumption may be very unreasonable. If a combination $a-b$ is rare—if, say, it only occurs once in ten instances of a —it follows that a cause of $a-b$ occurs only once in ten instances of a cause of a . The ratio of

probabilities now is $\frac{1}{10}$ to $\frac{1}{10^n}$, a ratio which gives a high probability to the first

alternative even for low values of n , and for high values an overwhelming probability. If (3) we have not to do with rival hypotheses, but have no hypothesis to offer, then, in any case, as the inference to some single cause is more probable than any other single inference; β taking the probability of the occurrence of any cause as $\frac{1}{2}$, the supposition of a single cause is as probable as all remaining suppositions combined; (γ) taking it as $< \frac{1}{2}$ (which we must do if the combination explained is rare), the single cause is proportionately more probable than all other suppositions together; and (δ) lastly, lumping together the supposition of either a single or a very simple collocation of causes against all more complex combinations, we get overwhelming probability.

ditions are really equal, there will (α), by our original theory, be an approximation to equality in their frequency over a great number of instances; but we now see (β) that the conditions which will in any given area give a deviation from this average, are rare in proportion to their complexity. Deviations so caused will be similarly rare.¹ It follows, conversely, that if a combination A - B be very frequent (or in the limiting case universal) in a given area, there are *three* possibilities. The first is, that that rate of frequency is maintained universally. The second is, that it depends on a collocation of circumstances. Now, this will be rare in proportion to the number of the instances found, and would be correspondingly improbable.² But there is the third alternative, that the whole might be due to a single cause P characterising that area as a whole. Against this nothing could be said on the simple ground of probability. It could be eliminated only by varying the area investigated; and then, again, there is nothing to prove that all the spheres of investigation are not subject to the same influence.

¹ It is this which makes deductive application of the laws of probability practicable. When we believe that b and c are "in themselves" indifferent to a, and when we have no reason to suppose a permanent force P in operation which favours b, the only cause of any excess of b over c will be a combination of circumstances. And the greater the excess the more complex, and so the rarer the combination required. Whence deviations from the calculated average are rare in proportion to their magnitude.

² We cannot therefore subscribe to Lotze's criticism of Laplace's remarks on the "improbability" of the forty three members of the planetary system revolving in a single direction. It is, says Laplace, four billions, or thereabouts, to one against such a set of combinations regarded as "casual." What does this prove? rejoins Lotze, nothing but "that the particular cause or grouping of causes adequate to produce this state of things is, or has been, real" (*Logic*, ii. 9, § 284). But it proves far more. It proves that if these motions are not in some way connected, such a combination would only occur once in four billion times, i.e. it is four billions to one that they are in some way connected. It must not, however, be inferred that this consideration as such would prove Laplace's or anyone's theory of how they are connected. Even that they are connected by a single cause is by no means probable in the ratio of four billions to one. There might be a combination of two, or three, or four causes giving the required result see Bouanquet on Jevons' account of Kirchhoff's proof of the presence of iron in the sun: *Logic*, bk. ii. chap. v. pp. 175, 178). Still, by our reasoning, the single cause will be the most probable. But to give it anything like certainty as against a dual or treble combination, further reasons must be forthcoming.

Our principle "of the single cause" (as we might call it) is well stated by Sigwart in relation to great divergences from an average: "Wächst die Zahl der Geburten in einem Jahr über den Durchschnitt, so werden wir wieder nicht annehmen, dass eine grosse Zahl individueller und unbestimmbarer Ursachen sich in einer Richtung; laufend die Differenz begründe, sondern dass ein weitgreifender und auf viele zugleich wirkender Einfluss thätig gewesen sei" (§ 191, p. 630). This is an admirable statement, but I do not find any thoroughgoing explanation of this and other interesting and suggestive remarks on the subject on any single intelligible principle.

The operation of a single permanent cause may be on almost any scale. That is to say, there is no improbability in the existence of "a permanent cause" or a concatenated series of causes persisting over a great area of space and time, and favouring A - B, or even determining it universally. Thus (to take an obvious example) animal life has existed on the earth for untold ages, but all along, in coexistence with a certain advance of geological development. No theory of probabilities could draw the inference that life existed from eternity, or that it preceded by a single age the requisite geological formation. A practical deduction, however, follows. A very large number of instances of a relation gives us two alternatives, and only two, namely, either direct connection of the facts related, or the persistence throughout the area investigated of a single permanent cause favouring their correlation.

8. Our conclusion is that the postulates of probability are justified. Facts will be conjoined upon the whole with a frequency proportionate to their absolute frequency and to the closeness of their connection. This holds both for any given area investigated and for reality as a whole, but in somewhat different ways. For a single area the frequency will be proportionate to the grounds of connection given in that area. These grounds may vary from one area to another, and so there is difference in the frequency of conjunctions. But again, so far as these grounds depend on "indifferent" conjunctions,—and that is precisely in so far as they are not interconnected with one another and the remaining antecedents of the conjoined facts,—their occurrence will have an average of its own, to which it tends in such a way that those will be commonest which give results in conformity with the calculated frequency, and those rarest which give the greatest deviations from that standard. So far, on the other hand, as frequency is dependent on a single cause, operating over the area investigated, we may have rapid and violent changes as we pass from one sphere to another. These cases do not interfere with the theoretical truth of the law of probability, since the operation of such a cause forms an important element in closeness of connection as above defined,¹ but they make an important difference in applying the theory. Lastly, the rate of frequency being taken

¹ For either the "single causes," making for two otherwise equally probable combinations, equate themselves over a number of areas, in which case the probabilities are really equal, and in the long run the combination will be equally numerous; or P, the cause of one combination, is more extended in the universe at large than Q, which is responsible for the other. In this case, the elements of the first combination are in reality more closely connected than those of the second.

as known, determines expectation or degree of belief as the most rational attitude of the mind in such a case.¹

At this stage our first account of probable reasoning, as resting on partial similarity, acquires a new and independent justification. Take first a case which we did not notice before. M , which = $l\ m\ n\ o$, is the ground of, or at any rate universally correlated with, P . In other cases we are given $l, l\ m, l\ m\ n$ respectively. In neither case do we know the remaining conditions $m\ n\ o, n\ o, o$, to be absent. But we simply do not observe them clearly. The expectation of P grows in strength from the first case to the third. For unless $l\ m\ n\ o$ are universally connected (so that l , for instance, is by itself the ground of the rest, and of P as well), they are partly independent of one another. Then $l\ m$ will have $n\ o$ more often, proportionately, than l ; and $l\ m\ n$ than $l\ m$; hence P will follow in a greater proportion of the instances of $l\ m\ n$. Hence the greater the resemblance known, when the remainder is not known to differ, the more likely the argument.

But, secondly, even when the residue is known to differ there is an argument. If P is the sole and whole consequent of M , it is true, as we admitted before, that P cannot follow unchanged from the curtailed $l\ m\ n$. But let the question be as to an element in the consequent, such as p . Now p may be associated with l or m , or n , or o ; and there is nothing so far to show which. That is, we have three chances out of four of finding p . I think this represents not unfairly the strength of such an argument, indicating that, in fact, it is worth little, in the absence of other knowledge, unless the proximity be very close. Indirectly, therefore, the argument from degrees of likeness—likelihood, as we might call it to distinguish it from probability—can be deduced from the axiom of the ground. And we may therefore point out here that it is really indifferent

¹ The theory of the text does not differ as much as might appear from that of Mr Venn. It agrees with him that the basis of probable argument to individual cases is *de facto* frequency. This frequency, according to Mr Venn, is observed in certain instances, and generalised by an ordinary induction (see, e.g., *op. cit.* chap. viii. § 10), and this inference rests on the general assumption that the same antecedents must have the same consequents. So far we agree. We only point out (1) that where we have to do with equally possible alternative effects, the nature of the conditions which we are led to postulate as explaining a given series is not simple. More than one alternative is open to us, and this affects the possibility of making a generalisation. It is therefore necessary as a preliminary to set forth the various conditions upon which frequency of combination may depend. And (2) that, given these conditions, the law of probability requires a definite meaning independent of specific experience, namely, that they are the causes and the sole causes of any given rate of frequency. The frequency of a combination may then be assigned deductively if we know enough about the causes of its elements.

whether we set out (as in Chap. VII.) with certain partial considerations, and combine them into a principle of demonstration, or whether we lay down the principle as axiomatic, and from it deduce the partial grounds. It follows from the axiom that there are but two considerations influencing belief¹ in unobserved cases—likeness to some uniform parallel instance,

¹ It might be thought that the dependence of degree of belief on likeness was a direct consequence of this. But that hardly seems to be so. The law of the ground knows of no degrees of belief. It may be forced to recognise doubt. For if A and B are partly alike and partly different, either to assert or deny likeness in their consequent C would be inconsistent. C can only be asserted on ground of the axiom, but can only be categorically denied on the same ground (e.g. that the consequent of B is always some D other than C). Hence, when the difference δ is not such as by experience to give categorical ground of denial, the axiom, to save its own character as the only principle of certainty in generalisation, must admit some degree of doubt. Then, it might be said, suppose some new point of resemblance discovered between A and B, must not this increase belief? No doubt it must from our point of view, but not as a direct deduction from the axiom. For it might be maintained that a partial consideration, strong or weak, could produce doubt, and doubt only.* We must therefore maintain our view of the justice of arguing from likeness, either (1) by making the existence of partial grounds, as determining a reasonable degree of belief, our initial assumption—our point of departure in the theory of generalisation, as done in the earlier part of the text, or (2) by the indirect deduction of the argument from the law of probabilities in its usual sense. When that deduction is reached, it is evident that the point from which our theory starts is no longer material. Whether we begin with the partial grounds or the axiom, we can deduce the rest.

* Jevons' explanation of probable reasoning is therefore a degree too simple. "We must," he says, "treat equals equally," and so must not without reason expect, with the least degree of belief, one alternative rather than another. This is all very well as applied to strictly equal alternatives. The difficulty arises when the alternatives become unequal, but not so unequal that one is altogether excluded. A and B can both happen, as we know at present, in n ways. Then we must not expect A rather than B. Now we learn n fresh ways in which A can happen. Then the question is, can n be treated as a wholly independent motive for expecting A, so that the probability of A is now to that of B as $m+n:n$? Of course, to the result we agree with Jevons. We believe that n can be so treated. But we point out that this assumes one of two things. Either (a) you must begin by assuming that every consideration which goes to form a total ground acts legitimately in determining the degree of belief at any moment before the totality is reached (there is no reason against this, but it is an assumption); or, (b) if you assume less than this, and hold merely that there are certain considerations which, taken all altogether, give a complete ground of knowledge,—if that is, you limit your assumptions in reasoning to the single belief in the inductive axiom, then you cannot prove directly that partial considerations would give any result but pure doubt. The justification of degrees of belief must be of the indirect kind which we have attempted to offer. Now it may be asked why one assumption is better than another, and to that we must reply that the second assumption takes less for granted than the first. Or, to put it differently, it is our business as logicians, not only to see what the assumptions of reasoning are, but to consider whether they are connected. If there is a way in which *prima facie* different assumptions can be unified, it is the business of logic to point out that way, and to follow it.

and difference from the same. It follows, further, that the frequency of a conjunction must have its cause, and that that cause must be in the antecedent of the conjoined facts and their relations to one another. And from these considerations certain calculations of frequency result, giving rational rules for that guidance of the mind which will bring it into closest approximation to reality. While from these rules, again, the guidance of belief by degrees of likeness is a further deduction.

CHAPTER XII

POSSIBILITY

1. WHAT we do not know for certain may yet be probable. And if not probable it may still be possible. What meaning and value are to be attached to this latter term? To begin with, it depends a good deal on the intention of the speaker. If I use it as a broad name for anything not proved to be impossible, it is clear that the certain and the probable will fall under it as species. A historical event, the laws of motion, or the multiplication table will all be possible truths. If anybody likes to use the words in this sense, I do not know what is to prevent him, unless it is the Horatian arbiter—

“cens,

Quem pene arbitrium est et jus et norma loquendi.”

Guided by Horace, then, we may remark that the possible has a more specific sense. It resembles the probable, in so far that no final and conclusive reason can be alleged for or against it. The motives for expecting it are admittedly incomplete; and whereas in the case of probability the grounds, however imperfect, were at least definite enough to admit of measurement, the possible seems to rest on grounds which either are measured and found to be weak (and so the possible would equal the weakly probable, or in ordinary phrase the improbable) or which are really too vague and indefinite to admit of measurement at all. In this case the possible would certainly not have a higher logical value than before. Logically, then, possibility seems to be an expression for the less definite forms of low probability.

We may pursue this line of thought a step further. The grounds of a belief may be taken as complete and final, and then we hold it as certain; or they may be strong though not final, and then we take it as probable. But supposing all these grounds to fail. Supposing all the probable arguments by which a theory is backed to disappear one by one, obviously it gets less probable at each step; as long as any single considera-

where the reason for meets no reason against, it becomes sufficient and decisive. Conversely, if the reason for is not decisive there must be a reason against. The ungrounded doubt is logically non-existent.

Or take memory. First eliminate the case when memory itself presents us with an alternative, *e.g.* if we are not sure which way a thing happened, how precisely a quotation runs. Apart from this, memory may itself feel more or less certain. I feel pretty sure of something that happened a year or two ago. I can swear to what I did this morning. In both these cases memory gives me one result only. That being so, *prima facie* there is a reason for asserting and none against. Why, then, have we not certainty in both cases? Why have we differences in the degree of belief? For the simple reason, that while it sometimes happens that a seemingly clear and certain memory has turned out false, these cases of course multiply as memory becomes remote, and, generally, as it "feels" weaker. So that here again we have a kind of sliding scale. The reason for only becomes absolute as the reason against falls to zero; and conversely, as the positive argument is weakened the negative raises its head.

Our result so far would be that thought or reasoning can only present us with two alternatives, and either of those are fatal to the conception of the unmotivated possibility. Either we have complete grounds for a belief. Then there are no grounds for the alternative. It is unmotivated, and it is (by our original certainty) impossible. Or we have incomplete grounds. Then we must have precisely complementary grounds for the alternative. It is possible, and it is motivated. The case in which there are no reasons for or against does not seem to exist. For in the second case above let the incomplete grounds for be diminished; *pari passu* the grounds against are strengthened; and in the extreme case where the *pros* fall to zero, the *cons* rise to certainty. That which is possible, it would seem, cannot be wholly unmotivated; nor that which is wholly unmotivated possible.¹

3. I have worked out this result in relation to our actual thought as it seems to operate in some, at least, of its applications. But it will not have escaped the reader that the argument involves a postulate which in the abstract is not self-evident. It can hardly be denied that an incomplete ground for the belief in a thing lands us in some stage of belief that falls short of certainty, and therefore in some degree of doubt. And so far it is clear that absence of reason for involves corre-

¹ Cf. Bradley, *Logic*, bk. I. chap. vii. par. 13.

sponding reason against. But, it might be urged, this only holds up to the point of pure doubt. Take away bit by bit from your reasons for believing a thing; this operates at first just like a positive reason for disbelief. At that stage it makes no difference whether a piece of evidence on which you relied is disproved, or whether counter evidence is produced. But this lasts only till doubt is reached. Then the effect of mere absence of evidence reaches its maximum, and further than this it has no effect. To disbelieve in any degree will require positive reasons to justify it. I may decline to admit any of the grounds of the "Patriarchal Theory," but how can I hold it to be disproved that human society began with the family? Surely the reasonable attitude is to say, "perhaps it did, perhaps it did not; there is no evidence to decide."

The natural rejoinder here is that the instance given is not a purely unmotivated possibility within the terms of our reference. Suppose that all Maine's arguments have been met and destroyed, there would remain the indestructible facts which suggested his theory,—the wide prevalence of the family in the human race, its undoubted antiquity in some races, the family tendencies of the higher mammals, and so on; these are at least analogies and suggestions, and, if so, in their weak degree, motives or grounds for the theory before us. Here, as in most cases, the instance which occurs to us of an ungrounded theory is in reality one which has much to say for itself, though that much may by no means be enough.

But here again, confining our view as much as possible to the abstract, we might be met by an alternative. Let it be granted that the unmotivated possibility is worth less than the *bona fide* doubt; that it occupies, so to say, a lower logical plane; still, it may be urged, that plane is not denial, nor trending in the direction of denial. Take doubt itself and consider its position. It occupies clearly a less advanced stage of knowledge than a positive well-grounded belief or disbelief. For these last involve complete knowledge of grounds, and doubt *ex vi termini* cannot have that knowledge. It appears then that as you recede in the scale of knowledge you fall, not from belief into disbelief, but from either of these into doubt. By analogy, as knowledge grows still less and less,—and that is our case as we work into the region of unmotivated possibilities,—you ought, if it were possible, to get still further into the cloudland of doubt; you tend to the region, so to say, of ultradoubt. Or (if you object that this shadow of a shade does not exist) at anyrate, you stay where you are in doubt's domain, and refuse to move out of it again towards denial.

I do not know that this position can be contested in the abstract. So long as the suggestion we are considering remains isolated in thought, and is not brought into relation with other beliefs, it may, perhaps, wander innocuous and unharmed—a shade among shades. But when brought into contact with a genuinely-grounded belief, it will have to flee like a ghost from the daylight. Thus, suppose a disjunction in which A is certainly true unless B is true, and suppose B to be an unmotivated possibility. Then are we to regard A as in any way uncertain? If so, are we not in effect doubting A without ground; and is not that illogical? And we may go a step further. If A is not certain unless B is false, I think we shall have to deny B, for otherwise once more we shall detract from A's certainty without ground. Thus, whether doubt or denial is the proper attitude for the unmotivated suggestion considered on its own merits, we must deny it any right to interfere with our otherwise grounded beliefs: we cannot allow it value of any kind in modifying the framework of our thoughts, and to express this ineffectiveness, if we want an epithet which shall yet not actually involve us in denial, we may perhaps call the unmotivated suggestion "worthless."¹

4. But this is not all. We have spoken so far as if grounds and motives and beliefs and doubts existed and could be treated

¹ It seems, then, thoroughly misleading to say with Jevons (*Principles of Science*, bk. ii. chap. x.), that the probable truth of an assertion where the conditions are wholly unknown is to be represented by $\frac{1}{2}$. This result rests, of course, on the view (which is *prima facie* legitimate) that the correspondence of assertion with fact is in this case a "casual attribute of the assertion," our mental condition being one of indifference as to its capacity for producing a true or false assertion. But there are two limitations to this argument. (a) In any case it holds only in so far as the degree or kind of correspondence taken as essential to truth is as indefinite as the non-correspondence constituting error. The definite relations constituting accuracy or scientific truth are obviously such as to be far less frequent, and therefore to offer us less chance of hitting on them than the vague *δρεπος* in which error wanders. The more definite the assertion, then, the less its independent chance of being true. "We shall win" is far more probable than "we shall win by 65 runs." Only when the alternatives are confined to two, and only when these are equally definite, can the antecedent probability rise to $\frac{1}{2}$. This is noticed by Jevons, but its importance is hardly made clear enough. (See Mr. Bosanquet on Sir Anthony Absolute, *Logic*, vol. i. p. 374.) But (b) in the case of the true unmotivated possibility we cannot even so use $\frac{1}{2}$ as our symbol without further qualification. For, to begin with, it does not differentiate two very distinct cases. Normally a probability of $\frac{1}{2}$ means, as we have seen, the possession of certain definite grounds in favour of a suggestion. And these grounds have to be considered in relation to other assertions. They have their weight in determining our system of belief, whereas here there is nothing at all with any weight capable of determining anything. Hence Terrot's symbol $\frac{1}{2}$ would seem to have much to recommend it. At the utmost, we could only say that the probabilities are $\frac{1}{2}$, as long as we treat the matter as an isolated suggestion without interest or importance for the remainder of our thought. We cannot be influenced in our estimate of classical literature by what we choose to think about "the lost compositions of authors unknown."

in the abstract. If we turn back to the modes of thought illustrated earlier in the discussion, and deal with thought as we have it, we shall find a more definite judgment. The sliding scale of reasons *pro et con* must be carried through consistently from affirmation to denial. But we see now, as the result of this discussion, just what this postulates. It means that, at least in certain relations, what thought cannot support it rejects; that it uses absence of support as ground of objection. This looks a bold claim. It seems to claim that thought is not only valid within its own limits, but all-sufficient and exclusive. And this we may have no right to say. Thought may not be "the measure of the universe." And assuredly there are more things in heaven and earth than are dreamt of, not only in our philosophy, but in all philosophies and all schemes of the universe put together. But to urge this against us here would be a misunderstanding. Thought merely claims, here as elsewhere, to be the servant of reality. She acts as *minister et interpres*, and in that office she maintains that every alleged truth must have its ground in reality; that so far as such grounds fail the suggestion is weakened; that that which finds no point of connection with reality at all has no claim to influence our beliefs; and, finally, that what is

But, further, even this plea is doubtful. For it depends essentially in accordance with the argument (a), on the assumption that the reality and unreality of a content are two equally balanced, equally definite, alternatives. A is real or unreal. Are these equal alternatives? A is true or false. Are these equal? It seems to me that if you say yes, you can only go by some experience, real or imagined, of the successes and failures of knowledge. Then you might perhaps say that where we have no knowledge to guide us, our guesses, if definite, are mostly wrong; while if very indefinite they are perhaps as often right as wrong. In the second case you might justify your symbol, but you would then be guided by the nature of your content in relation to knowledge which you assume yourself to have. If (b), on the other hand, you reject all such aids, how can you say that truth and falsehood are equal alternatives? How can you say anything about them at all? and how, therefore, can your statement have any measurable probability. Jevons' instance, "Is a platythiptic coefficient positive?" is misleading. For by the form of statement the subject is assumed to exist; and, moreover, to be something which must be either positive or negative. In this case it is clear that the condition of total ignorance is not realized. It is a case of *motived doubt*, and the motives are equal. This is assuming a platythiptic coefficient to be something real. But to the non-mathematical reader like myself—and it is the knowledge of the non-mathematician which Jevons has in view—the anterior question arises, Does a platythiptic coefficient mean anything at all, or is it only a nonsense expression invented by Jevons to poke fun at me? Then I cannot feel that the content positive platythiptic coefficient is as likely as not to be real. I cannot form any judgment of the subject at all. You might as well ask me what was the condition of the Samian aristocracy previous to their sending help to the Megarians against Perinthus, when I did not so much as know that there ever was a Samian aristocracy or that Megara and Perinthus were ever at war. The value, logically, of my judgment on the subject is not $\frac{1}{2}$, but nil. (See Bouanquet, i. 8, pp. 371 ff.)

incompatible with so much of reality as we know must be simply dismissed as false. It is this last point which takes us a step beyond our previous position, and which we have now to justify.

In fact, the principles already postulated as the basis of induction undoubtedly cover this conclusion. We assumed that the first beginning of generalisation was to draw inferences from the observed fact. We argue from uniformity. That is to say, given an instance of $A - B$, it is as such a reasonable ground for inferring $A_1 - B_1$. The converse follows, that the antecedent A_1 is as such a ground for denying that anything but B_1 will follow, i.e. it is a ground for denying C in the assigned relation to A , i.e. if you observe a fact in a definite relation to a second fact, you must not in a fresh case assert some different fact in that relation without some extraneous reason. Such extraneous reason of course there may be. Just as the observation of $A - B$ is not as such a sufficient ground for generalisation, so it is not a decisive reason for rejecting a difference $A - C$. But, just as before, the change, if it exists, must be inferred upon some ground in the field of observation. C must be inferred from D , and if there is no D , C cannot be inferred at all; while, if the concomitant D is such as in our previous experience has either B or any fact other than C in the relation to it which is here in question, D is *pro tanto* an additional ground for denying that C will be found. And so we might put the converse of the axiom of the ground: "If C does not follow A in a given case, it never does so unless a change occurs which is always followed by C ." Then if none of the points of change in a given instance are such as are followed by C , C cannot exist. Or, still more simply, if no fact in our experience is followed by C there can be no reason for asserting it, while every fact in experience is a reason against it.

For, suppose the question to be whether C is present in a given set of facts $A D E F G$. Take any of these, A , and suppose that while A is a known fact with ascertained concomitants in other cases, no recorded experience of A presents it in the relation to C here suggested. This, so far, can be looked on either as mere absence of ground for C or as so much of an argument against it. But it is a partial ground. Let the same considerations repeat themselves for $D E F G$. At every stage the process will have the same two sides. That which is not a ground for inferring C will be a ground against it; and when finally all five facts are considered, we have a system in which there is no ground at all for asserting C , and at the same time and for the same reason every ground for denying it. So far, then, as a suggestion would introduce a difference into the

order of facts as presented to us by experience, we can say indifferently that experience gives us no ground for making that suggestion, or that it gives us ground for rejecting it. And if this is true of experience as a whole, then the suggestion is negated by experience as a whole. In fact, this kind of unmotivated possibility has turned out to be a grounded impossibility.

If, lastly, it be objected that, experience as a whole not being "*cicero*," we can never be sure of bringing a suggestion to so complete a test; we may say, that if we find it rejected by every test known to us we must regard it as proved false by the best arguments available to us. Whether such a proof is valid must depend upon a wider question, whether the methods of our thought in general are valid,—and this we shall try to discuss later on its own merits. Understanding, then, by a groundless suggestion one which stands in relations to experience, which repel rather than affirm it, we may in the following discussion treat absence of reasons for, as equivalent to presence of reasons against, a suggestion.

It must be added that the "completely groundless" is that for which neither certain nor probable reasons exist. It may be that no A in our experience is related in a given way to C; but if α and α are found along with c and γ there is, according to Chapter X., some degree of probability for C, varying according to the value of the difference between A and α . Efforts to find a cure for consumption have so far been fruitless (A — no C), but any new discovery of a remedy for other diseases (α — γ) is so far an encouragement to investigators; and if a tubercular disease (α) has found a remedy (c), there is, as we naturally say, "no real reason" why a cure should not be found. Conversely, as the analogy we rely on to "remove initial objections" to C grows fainter, and especially as the differences grow in importance through their relation to other facts of experience, the grounds for expecting C fall to zero. That which is wholly groundless, then, is that which is opposed, not in part but altogether, to everything which appears in experience. If C is absent, not only from A but from α , α , and everything in the faintest degree resembling A, all analogy, remote as well as near, is definitely against it. The argument, it will be seen, applies only to suggestions bearing a definite relation to experience. A break or difference in the experienced order is negated just as that which accords with experience is affirmed, and on the same grounds. A content unlike anything which we know cannot be attributed to any order of reality resembling the order which we know.

It is different with suggestions which bear no assignable

relation to one experienced order. Under different conditions different results are obtained, and what is not suggested of conditions familiar to us cannot, on the ground of these conditions, be denied. This tends to justify the description of the purely unmotivated possibility at which we arrived above as "worthless" rather than "untrue." For we have to recognise that what is as yet imperfectly connected with experience, if it is but slenderly supported, is for the same reason but slightly repelled by the reality which we know. That which is ungrounded, not because experience denies it, but because we have not as yet tried to correlate it with experience, has met as yet no grounds for denying it. And so at all stages of its connection. In the extreme case of this contingency¹ we pass strictly out of the field of operation of our inductive reasoning, and in the absence of other guidance are constrained to fall back on the abstract arguments advanced above. Suggestions in this region can neither be affirmed nor wholly denied. But, regarded as possible claimants to jurisdiction in our sphere of thought and belief, they have no *locus standi*. In relation to a definitely grounded belief they are simply worthless. The suggestion then (we may sum up), which is groundless because not dealt with by any test, is worthless; that which when tried in experience is without ground is false. An unmotivated possibility is an ambiguous phrase meaning one or other of these kinds of suggestion.²

¹ Which might arise, for example, in relation to a sphere of reality supposed different from the world of our experience. It might be said that this very supposition of difference puts the whole example out of court. But this is not so. We might have tangible ground for believing in a sphere of existence very differently constituted from ours (e.g. a remote geological epoch, an ideal social condition), and then wonder, innocently enough if fruitlessly, what would happen there. The results of our wonderings could scarcely be denied, though they are logically worthless.

² I have been guided throughout the above discussion by principles laid down by Mr. Bradley (*Logic*, bk. i. chap. vii.; bk. iii. pt. ii. chap. iii., §§ 16-20; *Appearance and Reality*, pp. 387 ff. and 537 ff.) and by Mr. Bosanquet (*Logic*, bk. i. chap. vii. pp. 382 ff., chap. viii. 371 ff., chap. ix. 382 ff.). The distinction of "privation" and "exclusion" corresponds broadly to the case which does and that which does not stand in some definite relation to our inductive experience. The former is only not an entire fiction because, as remarked in the last footnote, experience itself may suggest spheres in which conditions very different to those familiar to us must obtain. Apart from some such case a propounded content could not have meaning and be without points of relation to reality, tending either to assert or negate it. Even here to say categorically that X is possible, goes, as Mr. Bosanquet shows, too far. We do not know X to be impossible, and the utmost we can say is that X may not be absolutely denied. In any given point, when we are ignorant, the value of a suggestion may vary from $\frac{1}{2}$ (when we have grounds both ways) to something which we may not express by 0 (since that means denial), but is far more aptly symbolised by Terrot's $\frac{1}{2}$ than by Jevons' $\frac{1}{2}$ (see Bosanquet, chap. viii.; and Jevons, bk. ii. chap. x.).

CHAPTER XIII

THE INDUCTIVE METHODS

THE position reached in our last chapter has an important bearing on the principles of generalisation which we assumed at an earlier stage (Chaps. VII. and VIII.). These principles laid down, (α) that an uniformly observed parallel relation is always the ultimate basis of a general statement. Any such relation is, in the absence of counter considerations, a reason for generalising, and no other basis for generalisation exists. Hence (β) a difference in the consequents of a given fact in this case as compared with that can only be due to a difference in the surrounding facts. But conversely, any difference in the surroundings uniformly found to be followed by a change in the consequents is a basis for arguing to such a change in a fresh case. But (c) in accordance with both the above assumptions, any relation to which exception is found not being uniform ceases to be as such a basis for inference in a fresh case. And hence (d) any uniformly observed relation A - B must be generalised if no concomitant C exists, a change in which would always be followed by a change in B. But this deduction may now be extended. If C does not exist, A - B must be universal. But if we have no reason to suppose C to exist, then any suggestion of C is logically worthless, and no reason can be assigned for doubting the universality of A - B. And if, further, A - B is a familiar relation, the fact that we have no reason to suppose C means that in our experience C never accompanies A, and so is a definite argument against C. For to suppose it to exist here would be to suggest without ground a difference in the order of our experience. We have to apply this argument with the limitations laid down in the last chapter. If there is no certain argument for C there may be probabilities or analogies in its favour. But as these diminish its improbability grows, and when they vanish it is disproved in accordance with the "best tests at our disposal." We need only add that *prima facie* any sort of relation may turn out to

be universal, and any sort of change in the concomitants may make a difference—which points of resemblance or difference are material can only be determined by experience. Thus when we apply the principles of generalisation to the facts of experience two alternatives at once arise. $A-B$ will be universal unless there is a C which makes a difference, and in proportion as C is probable $A-B$ is unlikely to be universal, while in proportion as the grounds for supposing C disappear our belief in the connection of A and B is bound to increase. The relation of these alternatives is the fundamental fact of induction. This being understood, our principle may be viewed indifferently as stating that the single consideration of correspondence to an uniformly observed relation becomes the total ground of belief required, on the disappearance of any ground for supposing a disturbing element, or that it is swelled to the totality by the addition of reasons proving the impossibility of such an element. The possibility of the disturbing concomitant is the "counter-consideration," to apply the phrase used above (Chap. X.), which must be dismissed before a suggested generalisation can be affirmed.

From what we have said it will be clear that the whole difficulty of generalisation lies in the complexity of the accompanying facts along with which any connected sequence is given. The true universal lies, as it were, embedded in a mass of extraneous and irrelevant material, from which it is our business to dissect it out. Or more strictly, the whole mass of matter is a concretion of interpenetrating veins, each of which requires to be traced out separately. Or it is a tangle of many threads which science has to unravel. If, hypothetically, we start by assuming any two points to be connected, to belong to the same thread, we have at once a host of other possibilities. Any one of the concomitants in continuous connection with the consequent may *prima facie* just as well be the true universal antecedent as that on which our fancy has happened to pitch, and our business must be in one way or another to eliminate these possibilities. The basis of our work must be the principles of generalisation as now explained and the laws of probability as deduced from them. Let us consider the methods derivable from these presuppositions.

1. *Simple Enumeration.* To generalise from a single instance without attention to accompanying facts or other considerations is, as we all know, the mark of purely childish, ignorant, or superstitious thought. B may follow A here, but a moment's reflection convinces us that A was only one of many facts related to B , any one of which (for all our argument can

tell us) is as likely to be connected with B as the A which we have happened to notice. Or to put the same thing in different words, a change in any one of these is as likely as not to cause a change in B. The generalisation, then, which we might base on the observed relation A - B is met by a counter generalisation of much greater strength, namely, that this relation, like others, will be immersed in concomitants, any one of which may affect it, and the probabilities are that the relevant antecedent will fall within the mass of concomitants rather than in the fact arbitrarily selected. Or, as we may more succinctly put it, relations so observed are more often changed by their concomitants than not. Hence, without even considering whether counter instances of A without B, or closely parallel instances of a or a without B, can be found, we have ground for dismissing the argument on the score of general probabilities. It is met by a counter consideration stronger than itself.

We pass now to "Simple Enumeration" in the ordinary sense, when the single instance of the last paragraph is replaced by a number.

Replacing the single instance by a number, the argument from "simple enumeration," taken quite strictly, proceeds by simply counting instances of the relation generalised. There is no sifting of instances, no comparison with the negative, no attempt to get cases of diverse circumstance or in diverse areas. The results are proportionately vague; and if the familiar generalisations based on the method do not mislead us, it is rather because the mere weight of numbers does for us unconsciously the work of elimination and sifting which logic would demand that we should do for ourselves. We expect the sun to rise because it has risen so many times, and the expectation is well grounded; because, though we may not reflect on this, the sequence has in fact been observed under so many different circumstances that we could know it to be independent either of our earthly changes or of great numbers of heavenly collocations. But, apart from special cases, what in strict theory does simple enumeration prove? Suppose we have observed a given combination A - B a hundred times over, and no case to the contrary, what does that show? There are several possibilities.

First let it be remembered that there is nothing in *simple enumeration* to show what variety there may have been in the instances taken. For instance, did they all come from the same "area"—i.e., if it was a botanical observation, were all the instances from one hillside; if a historical matter, were all from one nation or one period; if a question of literature or

art, were all from one author, one style, or one school? Whatever the "area" examined may have been, great or small, varied or monotonous, let us call it *M*, and recollect that its character will have an effect on our results. Now, the combination *A - B* is observed very commonly in the area *M*, and no instance to the contrary is noticed;¹ then, either the said combination must be indefinitely more frequent than its negative, or we must suppose that each of our observations happened to coincide with one of the positive instances. The improbability of this will be proportionate to the number of instances. For example, suppose the combination *A - B*, *A - not-B*, equally common in the given area. Then the fact that our observation lights on *A - B* or *A - not-B* must be regarded as purely casual; the probability of either alternative will be $\frac{1}{2}$. Hence the probability of two successive observations of *A - B* will be $\frac{1}{4}$, and that of 100 such will be $\frac{1}{2^{100}}$.

Hence, given such a series of observations, the probability that *A - B* and *A - not-B* are of equal frequency in the area *M* is indefinitely small. Of course, the improbability decreases as we increase the frequency of *A - B* relatively to *A - not-B*. But the most probable single supposition will obviously be a *de facto* universal combination of *A - B* in the given area; and while approximate universality will be but slightly improbable, anything but an approximate universality will be very highly improbable.

But of this *de facto* universality there are now four possible accounts.

(a) *A* or *B* may be very frequent or omnipresent in the area *M*, but there may be no universal connection between them.

This may hold whether *M* be large or small. Rain falls (*B*) four or five times on days predicted in an almanac (*A*). The facts are at once connected in the ordinary mind, but a little investigation shows that the almanac predicts rain on twenty days of the month. The fly (*A*) on the wheel (*M*) sees dust rising before it (*B*) wherever it goes, and concludes that it raises the dust, the fact being that both fly and dust will be wherever the wheel is. Again, every birth, marriage, or death recorded has coincided with one and the same position of the Polar star. Now, in all these cases it is logically possible, but practically it may be misleading, to generalise the combination.

¹ In a way this is observation of the negative, in the sense of looking out to see that the negative is absent. Bacon is obviously right in his view, that, apart from so much observation of the negative, there is no beginning of inference at all.

As long as the fly continues on the wheel, so long it will see the dust rise. But the connection is indirect, and there is no real dependence of the rise of the dust on the presence of the fly. Nor do we suppose the position of the Polar star to have anything to do with our births, marriages, or deaths. In this case there is not the slightest reason for alleging any connection, near or remote, direct or indirect. The combination is due entirely to the omnipresence throughout the area examined of one of the elements. Putting the whole matter in general terms, we may say that where $A - B$ is universal in a given area M , this may be due to the omnipresence, or even the preponderating frequency, of the element B in M . And this may be the explanation whether M be very small or very large.

(b) If, as a matter of fact, neither A nor B is very frequent, there may, again, be a force or condition P common to M upon which $A - B$ follows. Thus water, in our ordinary experience, boils at 100° C.; but this is, in fact, due to the approximate constancy of atmospheric pressure under which our experiments are made. M is here the sea-level, or something near it, anywhere and everywhere, but we cannot generalise beyond M . Two inventors hit on the same idea concurrently, the cause being the position of the science or art at the time. In none of these cases need there be any direct connection between A and B , nor can we infer to their combination outside M . But it is important to notice that the probabilities distinctly favour a single cause. This follows from the conception of probability above explained (Chap. XI. p. 310). That in a given area a single cause P should favour $A - B$, will occur once, say, in n times; but that two distinct causes p_1 and p_2 should both favour $A - B$ in the same area will occur once in n^2 times; its probability will be $\frac{1}{n^2}$. If more causes, p_3 and p_4 ,

are assumed, it will be proportionately less. Hence, as our second alternative, we must put the presence of a cause (not causes) favouring $A - B$.

(c) Thirdly, $A - B$ may be generally connected, i.e. apart from M and its peculiarities. But here, again, there is more than one possible case. A and B may be such as both to follow from a common C . Thus in yawning or sneezing, a complicated combination of muscular contractions takes place, but all probably in consequence of an irritation of some centre.¹ Here, again, direct connection is not proven.

¹ Of course, only contemporaneous contractions are available for purposes of illustration; where, as in breathing, inspiration gives the stimulus for expiration, and vice versa, we have direct causation.

(d) It is only when this last possibility is eliminated that we get to the fourth and last alternative of a direct causation of B by A. Hence, summing up, we may put it, that simple enumeration, taken strictly, proves a *de facto approximate universality of coincidence within the area examined* with a probability proportionate to the number of instances observed, but that of four alternative conditions under which such an universality can result it gives us no evidence which should make us prefer any one. And until the first alternative is excluded the whole process is nugatory. What we want to know is this—whether the fact of A's presence will assure us of B's presence. To learn this we must know that B accompanies A, not because it is "there" already, but because A introduces it. This our present method has not begun to prove, and it has not therefore added to our knowledge. If A and B are both permanent parts of the structure of Nature, we could infer their constant conjunction without observing it. To prove a conjunction to be grounded on some connection, and therefore to hold in the main or altogether apart from other facts, requires a further step.

2. *Simple Enumeration with Negative Instances.*

In taking this step we leave simple enumeration proper, and follow Bacon's precept in observing the converse truth to the one required. That is to say, we observe and record not merely the conjunctions of A and B, but also what we may call succinctly their conjoint absence. Not that we have yet arrived at the method of difference. That method postulates a careful attention to the *concomitants* of A – B, and bids us look for instances in which these concomitants remain as nearly unchanged as possible. At present we pay no regard to concomitants, but note merely in a general way that in cases, not otherwise described, where we have A we also have B, and where we do not have the one we cannot find the other. Now these observations taken together render it improbable, in proportion to their numbers, that A and B should be omnipresent¹ or very numerous (apart from the cases of their conjunction) within the area M. For, if we assume the contrary, we are at once confronted by the improbability that our observations should so very often coincide with two out of four possible alternatives. Assume A and B to be equally frequent in separation and in conjunction. There would then be as many instances of the one to be observed as of the other; yet we observe none of separation and many of conjunction,

¹ This, indeed, taken strictly, is of course rendered impossible by a single observation of the absence of B.

which is improbable. As before, then, the probability of indifference is very low, and it rises as we approximate to the assumption of an universal conjunction within the area.

And in the present case this conjunction cannot be due to the mere frequency of A and B; for if so, there would be cases of A without B. Hence, the first alternative left us by simple enumeration proper is eliminated, and there *must be some connection*, though this may still be explained by the remaining three alternatives. Either, that is to say, there may be a cause common to M connecting A and B, in which case nothing can be alleged of the relation outside the area observed. Or the connection may be indirect—A and B both following from C. It would then hold outside M, but would not, as we shall show later, be the same thing as a direct connection. Or, lastly, there may be a direct causal connection. Still, though all these alternatives are left, we have made an important step. We have left the region of pure collocation behind us, and have stepped into that of probable connection, i.e. of inference, the result being that, *at least in any area resembling M in its permanent or general characteristics*, the conjunction A - B will probably¹ hold good.

We need not give many examples of this familiar form of inference. It is bright when the sun shines and dark when it is hidden; whence we derive the primitive generalisation, that the sun is the chief source of light on our earth. Or, to contrast our present method with the last, if the weather prophet could show not only that rain fell on the days indicated by him, but that he did not predict rainfall for any days which were fine, we should begin to listen to him, and our credence would, I think, be a question of numbers. Still, a very wide generalisation may be upset. That all men are black was once, I suppose, an uncontradicted generalisation of enormously wide extent in various parts of the world. That twenty miles an hour was an outside figure for the extreme limit of human speed on a long journey was as wide and unbroken a result as any that you could name a few years before the "Flying Dutchman." These results were upset, and so may those be which remain unbroken for us now. The probability against any one such inference is doubtless small, but remains always some positive quantity.

So far our results have been deduced from the theory of probability. We may corroborate and extend them by taking

¹ Probably—because there is a chance small in proportion to the number of instances, that the conjunction is due to a complicated combination of circumstances instead of a single apparent characteristic of the environment.

the argument in connection with counter considerations. We pointed out that when we tried to generalise from the single instance we were met by the counter argument which showed that a change was more likely than not. Applying this process to more numerous instances, our counter generalisations would gradually decrease in strength. What I have observed five times without a contradictory instance will more often turn out universal than that which I have observed but once. My argument in favour of a change relies, be it remembered, on the multitude of concomitants, and the frequency of changes among them. But on this very ground I must suppose many changes to have taken place within the cycle of five cases, and these without affecting the relation. Conversely, the permanent facts among which the cause must be sought are reduced in number, and the chance that any one of them is the cause is proportionately increased. The same result holds if we compare a hundred instances with five, a thousand with a hundred, the universal experience of mankind with any definitely enumerated set. We may put it, as the number of instances increases, the cases in which a change in the concomitants affects the relation become less numerous, and therefore the relation itself more probable.

What holds of uniform relations applies *mutatis mutandis* to rates of frequency. Put the case thus: A and B are found together in m instances and apart in n ; that is, their conjunction has a frequency of $\frac{m}{m+n}$ in the area observed. Now, *prima facie* this frequency can be generalised just as any other fact can be generalised, and with the same limitations. That is to say, the ratio $\frac{m}{m+n}$ may be expected in any other area with a confidence proportional (α) to the width of the area in which it has been already observed, and (β) to the general affinity of the two areas compared. Of these considerations, (β) is obvious, while (α) merely assumes that causes disturbing the ratio of frequency will be more likely to occur in a large than in a small area. And this, I suppose, is matter of record as well as of theory. Hence, if a rate is constant over a wide area, it may be generalised with some safety. This result is at once a deduction from the theory of chances, and a generalisation at which we might arrive by simply considering recorded facts. The death-rate may be constant for two or three weeks, but subject to heavy seasonal fluctuations. Its mean actual rate and seasonal fluctuations are far more constant. You can infer from year to year better than from week to week, because, apart from theory, you find more constancy from year to year than from week to

week.¹ We must notice here that the inference to the maintenance of the general average is in this case stronger than that which concludes to the particular case. You can infer to the average price of an article next year with more likelihood than for any given week in next year. For let the probability of the maintenance of the average be p , where p is less than 1. Then, given this average as *certain*, there are the fluctuations from week to week to be considered. Suppose the weekly average comes within 2 per cent. of the annual average q times out of r where $q < r$; the probability of the price on any given week falling within 2 per cent. of the average of last year will be $p \times \frac{q}{r}$, i.e. less than p . An average, then, may be predicted with more confidence as an average than as determining a single case.

Again, the deduction from the theory of chances, that when an uniform conjunction is broken there will be some change in the permanent character of the surrounding conditions, is also an induction from experience. We find by investigation the change through which a conjunction universal here is infrequent or absent there. If a disease breaks out in this district, while another is left unscathed, we find the cause neither in the working of chance nor of the devil, but in bad drains, communication with an infected area, and what not. And so with other collocations. Hence, generalising these discoveries, we may expect them in other cases.

And here an important point follows for the application of a result of this kind. If the universal relation noticed is due to the character M of the area examined, it will hold in another area if M existed there too; and if not, not. Now, if we have noted M and proved its connection, we are at an

¹ Sigwart (*loc. cit.* § 101) denies the possibility of generalising an observed rate of frequency unless we can make some hypothesis as to the causes of the conjoined phenomena. You cannot (p. 514) assume that the conditions on which the given rate of frequency depended in the observed area will be maintained in another area. But (p. 515) you can make a probable hypothesis as to the nature of these conditions. But having got his hypothetical conditions, he has to assume (p. 518) that when no circumstances are present favouring a combination its frequency will be proportionate to that of its elements. Now, this is all that we assume. And assuming it, it follows that the frequency observed in a given area must either be maintained or depend on circumstances peculiar to the area. This is true whatever the conditions may be, and we are not therefore bound to postulate other knowledge as Sigwart, p. 516) before we can argue at all. On the contrary, we get from the facts of frequency the best range of knowledge as to the connectedness of our elements. The introduction of the hypothetical conditions is a needless complication. Of course, in any concrete case where something is known or reasonably believed as to the conditions, our interpretation of the facts of frequency may be modified. But there is a logical interpretation of those facts which is possible apart from any special knowledge.

altogether higher stage of inductive argument. But short of that we may have "no reason" to suppose a change in the conditions; that is to say, the character of the new case does not impress us as unlike the old—there is a broad general similarity between them, and obviously the greater the similarity the more probable our conclusion in any fresh instance. The obvious step which follows is to analyse the points of resemblance so as to convert the similarity into an ascertained exact resemblance. And as this process goes on, simple enumeration develops into the method of agreement.

3. *Simple Enumeration with Variation of Area.*

The most elementary stage in the process just indicated is the following. Without examining the concomitants we may simply change the area of our observations. And this has a considerable effect on the probable conclusions. For example, we have hitherto examined a given period or a given place. The result is a connection holding for that period or place. We now change the scene, and still find the connection good. Hence, if this connection is due to any cause "external" to the combined phenomena, this cause will probably be something common to both areas. For, as we showed before, the supposition of distinct causes is improbable. At every increase in the number of areas examined this last improbability grows, and we must therefore, as our result, have either an internal connection or a common cause for such connection, holding in an indefinite number of different areas. A further probability will now follow, that either this common cause is non-existent or that it is universal in space and time.

Thus instances of the law of gravity may be found on the earth's surface at any part, within the earth, all over the solar system, or in the almost infinitely remote systems of "multiple stars." Certain attributes of human nature, again, appear constant from the earliest historical records to the present day, and from London or Paris to the Malay Peninsula or Tierra del Fuego.

It might be objected that this kind of variation is superfluous, for we have already insisted that space and time as such can have nothing to do with any causal connection. But difference in space or time means probable difference in the concomitant facts, while, conversely, persistence in one region means probable persistence of the same set of concomitants. In the method of agreement we pay special attention to the nature of these concomitants, but so far as they are too complex or too

subtle for our observation, we have to fall back on this simpler and rougher method of varying time and place. In either case in practice we vary just as much as we can; and if we cannot vary anything with certainty but place and time, we vary them.

Another point may be raised on the universality of the inference. The areas M N O P . . . now examined may still have something in common, and it is therefore unsafe to infer beyond them. This depends on the difference between them. If I survey mankind from China to Peru, my conclusions will have a very strong probability as applied to all the humanity of the present day. But nothing can so far be inferred as to the past, except so far as I have grounds *abunde* for taking certain races or classes now living as representative of past stages of human existence. On the other hand, supposing that I took my instances "at random" from very many different cities, nations, races, and tribes, it would (as before) be improbable that I should light always on cases pointing in one direction, unless those cases were either universal in the area or at least enormously preponderant. It results that if M N O P are all contained within the area Π , and if they are taken at random in that area, we can generalise with great probability for the area Π . And Π may be indefinitely great, as it is specially in the instance of gravitation. Or it may be co-extensive with our practical interest, as it is in those cases when it is conterminous with the limits of our earth, a fortunate circumstance, since most of the truths which we commonly speak of as universal are subject to the limits of terrestrial observation.

4. *Simple Enumeration of Definite Coincidences.*

Ceteris paribus it is easier to hit a big target than a small one. Similarly, a vague relation is *ceteris paribus* more probable than a definite one. Any sort of coincidence will satisfy a vague mind of the existence of a causal connection. Mrs. Nickleby put her feet in hot bran and water somewhere about Christmas, and was delighted to find that by Easter her cold was entirely gone. Every kind of popular superstition relies on any sort of fortune, good or bad, as the case may be, befalling a man or his relatives at any period near or remote from the occurrence vaguely connected with it. You spill the salt at dinner, and six months afterwards your mother sprains her ankle. An expert in palmistry foretells misfortune, and within ten years you lose a dear relation. These are the coincidences which form the basis of much popular and not a little "scientific" induction. Viewed as phenomena of

mental pathology, they would afford matter for a long and subtle investigation. Logically they are one and all instances of what I may call the fallacy of the big target. You give fate an enormous mark to shoot at, and are surprised that she hits.

If I drop a die at random on a chessboard, the chances are $\frac{1}{64}$ that it will fall on any given square. If I divide each square into 4, the chances are $\frac{1}{256}$ that it will fall on any one of those smaller divisions. If, instead, I group the squares by fours, the chances are $\frac{1}{16}$ that it will fall on any one of the groups. The probability, in short, varies inversely as the definiteness. Similarly, in the ordinary course of things a good many misfortunes pursue me during life. Suppose that for my sins misfortunes on a certain scale occur once in five years; taking those which primarily affect friends and relatives into account, the proportion will, I fear, be much greater. It will be improbable that any such misfortune should befall me on a given day, and if you predict it for that day and it comes to pass, I shall think it very remarkable. But that "something should happen" within a year or, vaguely, "sometime or other," is not at all improbable, but is, on the contrary, to be expected, and you will be not only a bad but a very foolish prophet if you do not predict it. Almanac makers will serve again as an illustration. "About the middle of this month a danger will befall a great potentate." This is obviously fulfilled if the King of Abyssinia breaks his leg on the tenth, or the Russian police invent a Nihilist plot on the twentieth. A little judicious vagueness and your reputation as a prophet is secure.

Enough will have been said to show the many degrees of definiteness possible for any given relation A - B. And it will also be clear in a general way, that since its improbability increases with its definiteness, so, if we actually find it occurring, does the probability of a connection. Let us put the matter numerically to give an idea of the relative probabilities in different cases. Reverting to the chessboard illustration; suppose I drop two dice instead of one, what is the probability that they will fall¹ wholly or in part on the same square? Clearly $\frac{1}{4}$, for supposing one die to fall on any square, there are 63 on which the other may fall without fulfilling the condition. But if we anticipate that they will fall "near" each other, we could not tell precisely what would satisfy this requirement. Probably we should regard it as met by a fall within four squares, and its probability would be one $\frac{1}{16}$.

¹ Nothing being determined as to the manner of throwing them.

Hence, again, two successive falls on one square will have a probability of $\frac{1}{64 \times 64} = \frac{1}{4096}$, and two "near" falls one of $\frac{1}{14 \times 14} = \frac{1}{196}$. Conversely, the improbability of the first event *without some connection* will be 4095 to 1; that of the second, 255 to 1 only. The difference will be still greater if the word "near" be taken more indefinitely.

Similarly, if B follows A in several instances at the same definite interval, the probability of a connection is increased enormously. "Post hoc ergo propter hoc" becomes a respectable argument as soon as the *post* is definitely measured and is found constant. I strike a match and it lights immediately; if it lit ten minutes afterwards I should not, apart from other knowledge, connect the two events. Conversely, if I light a "half-hour fuse," I expect the explosion in half an hour; and if it follows in five minutes, something else must have caused it. A B and C all take the same remedy, and all recover, one the same day, the second the next week, and the third, after a long and acute illness, two months later. This would not be very favourable to the efficacy of the drug. Conversely, all three are subjected to coal-gas poisoning, and similar symptoms occur in each in regular order at approximately equal intervals, whence we infer a connection.

It is still only a connection. The present method must be combined with the last if we are to eliminate the possibility of a "common external cause"; and that effected, it is still open to us to suppose the connection to be indirect. The point here is simply the increased probability of some connection or other. And we should notice that we come now to the point where this probability can be put in either of two ways with equal force. Given A

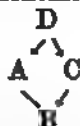
|
B

a definite relation, we may infer (1) *directly*, it is improbable that this should be repeated unless there is some connection between A and B; or (2) *indirectly*, it is improbable that any fact C disconnected with A should so synchronise with it as to bring B into this relation. The scheme

A C
|
B

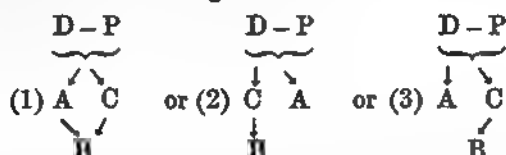
where A C are not connected, is improbable. Hence, by the axiom of the ground, A or some D connected with it is probably the cause of B.

On the other hand, the scheme



where C is the cause of B, and A and C joint results of D, has nothing to be said against it, and is not rendered improbable by any repetition of instances.

But notice here that if the relations A D, D C, C B are strictly universal, the relation A B must in fact be so too. D and C will bring A B, if we may so put it, into that relation with one another. But if our aim is merely to get at universal relations, if we know nothing of any distinction between the causal and the casual save the difference between that which is universal and that which is not, it would appear that the alternatives give us a distinction without a difference. A - B will be in fact universal, no matter whether as part of a system of universals or independently. But this introduces us to another equally important contingency. B cannot be wholly imputed to any cause P disconnected with A, universal or common in the area examined, or we should have instances of B without A. But P may be a normal characteristic of the area, and D may act on P so as to produce both A and C and B through C. Thus



In the second case, which is equally probable, A would not be an universal condition of B; for suppose D in any other area, it will produce C and therefore B, but there will be no A. In the third case, A will not always be followed by B; for in another area D will not have P to act on, and therefore will not be followed by C - B.

We have come now to the last word of "simple enumeration," to give that name comprehensively to every method which relies on the fact of conjunction without regard to the character or concomitants of the conjoined facts. Whether we rely on the theory of chances or on checking our method by counter-generalisation, it is clear that the highest forms of these methods give us probability approaching to certainty of some close connection between A and B. It would be hard, we

may even say impossible, to produce instances of facts recurring regularly in definite relations and in very diverse portions of space and time without being closely connected. We may therefore take that much as capable of being established by the methods referred to. But between closeness of connection and strict universality there is nothing in these methods to choose. The dependence of boiling on a considerable increase of temperature is as definite a relation based on as large an experience as could reasonably be demanded, but is entirely upset (as an unconditional relation) by the experiment *in vacuo*. The simplest and most obvious experience thus indicates, that concomitants to which no attention has been paid may affect the relation investigated. And this holds for all "simple enumeration," from its lowest to its highest form. Until the concomitants are considered and proved irrelevant we always have ground for doubting the universality of the relation. And the objection rests not only on specific counter experience, but on inferences which, as we shall see, become necessary when different sequences are compared with one another, so that we can prove by the internal character of sequences that it is not, as it stands, independent of further conditions.

The truth, of course, is that so far we have considered only one side of inductive argument; and even that, we may say, inexplicitly and roughly. For it is not number of instances *qua* number that we use in argument. Our whole principle of generalisation rests on the view that numerical differences are unessential. It is only so far as numerical repetition *indirectly involves difference of context* that it affects our argument at all. It is true to hold that all induction depends on the character of the contents connected, and repetition of instances can serve no purpose except that of incidentally varying the content or its context. Now this variation, begun at its lowest stages by enumeration, may be carried further by explicit comparison and analysis directly aimed at this end. And this is the scope and object of scientific induction.¹

¹ See the admirable remarks of Mr. Bouanquet (*Logie*, bk. ii. chap. v. §n.). As to the form of Enumerative Induction treated by him (bk. ii. chap. ii. *out*), they have certainly no more validity than he allows them. As generalisations, without the limitations laid down in this chapter, they are nothing more than suggestions. On the whole subject I may add that I have stated the case for the form of enumerative induction at its strongest, in order to avoid over-estimating the influence of "scientific induction," to which a defender, in the main, of Mill's views might otherwise be led.

CHAPTER XIV

SCIENTIFIC INDUCTION

The methods hitherto described relied mainly on the fact of conjunction and its constant repetition. But already in the highest development of these methods we were forced to pay some attention, on the one hand, to the character of the conjunction itself, so far at least as its definiteness or precision were concerned; and on the other, to its surroundings, so far as these are indicated by the extent of space and time pressed into our service. The methods which follow are distinguished by relying entirely on the *character* of the conjunction together with its concomitants in different cases.

(1) *Inference from persistent identity.*

(a) Every event, as we have already pointed out, occupies not a point but a section of time, and is itself not an atom but a segment of reality. It is, in short, a piece of continuous existence. It may preserve its character for any length of time from a fraction of a second to a geological epoch, but in either case it gives rise to a certain inference which is of assistance in the work of discovery. A, not being an atom but at least a fragment, contains within it before and after, antecedent and consequent; and when A is an expression for a state of rest, and not one of change, a deduction can be drawn from this. Either A (the character of the fact) determines its own continuance, and then in the limiting case where A is actually the total determining factor, it follows that A is eternal; or A rests wholly or partially on certain surrounding facts X. Thus a colour, I suppose, depends always on other states or attributes of the coloured material. In this case, in order that A may change, there must be such a change in X as universally determines a change in A. Unless there is a change A will continue, and unless there is evidence for such a change we must expect A to continue. A once known to exist, and being an unchanging character of some sort or other, is ground for the expectation of its own persistence, and sufficient ground, in

the absence of evidence for anything which necessarily introduces a change into it. This is just the converse case to that in which one "fact" is connected mentally with "another," i.e. when two different or discontinuous contents A and X are connected. For here, by the same reasoning, it is clear that unless X itself is a name for a section of a process of change in the direction of A, it is impossible that X should become A without some further accompanying fact determining that change. For X as such remains X, and X is not A nor tending to become A. Hence to turn it to A, X, whatever it be, must be modified.

This is the first distinction made in our views of a conjunction by the character of the contents joined, and accounts broadly for the difference in our attitude to the great permanent facts of nature on the one hand and the changes and transitory incidents on the other. No one sets out to inquire why a thing remains what it is. Change and difference alone present a *prima facie* problem to the mind, and stimulate inquiry. It is only an extended experience, showing that, after all, much that seemed stable suffers change at last, which drives us to the further inquiry whether the continuously identical is also self-determining—independent of surrounding conditions.

(b) But there is another form of continuity which we use as a basis of inference, namely, continuous change, the given process by which one fact becomes another, turns into another. We have just seen that an unchanging content E could not of itself be the totality of conditions on which any different content B should depend. To become B there must be something, as F, which effects a change in E. If a stationary body begins to move, if a liquid freezes or turns to vapour, if a colour changes, or a sound rises or falls, there must in each case be something other than the original state which "makes" the change. Now, when we speak of a change, the point of interest on which we tend to concentrate attention is the state of the facts before and the state after the change takes place. And both these are or may be states of rest—contents persisting for a longer or shorter time unchanged; while the actual process which unites them is harder to fix in our minds, and is comparatively neglected. Hence, when we come to think of change as we have learnt to figure it, it appears as a kind of jump, and almost as a miracle. Here is something, and here a moment after is something else, and there seems no more connection than in a conjuring trick, or the nursery rhyme, when

"A raven cried 'Creak'
And they all tumbled down."

But this succession of differences is not really change, strictly

so called. You may define a change by the state or quality from which it begins in comparison with that in which it ends, but this only illustrates the inadequacy of definition and analysis. In fact, a change proper is as indefinable as any other fact of sense, and we can only attempt to assign its characters so far as to avoid confusing it with other facts. A change, then, we may put it, does not consist in two different states with an interval between, but in a process from one state to another. And even this may be misleading if we press the word state. Strictly speaking, so soon as a state, i.e. a persistent and permanent quality, comes into existence, there change is at an end. It is the changing itself (if I may put it by a kind of tautology) which constitutes the change. I will illustrate this by a familiar definition. Motion is spoken of as change of place, and then it would seem comes sometimes to be thought of, as though it consisted essentially in a series of rests and jumps, each of very small duration and extent; and the paradoxes of motion have been derived from this idea. But this conception overlooks the fact that the basis of all our knowledge of motion consists in certain given or apprehended contents. Motion is primarily something that I see or feel. It is a continued process characterising certain realities presented to my sight and touch. This process involves differences of position in the body moved as one of its characteristics. But this is not its whole character: and it excludes the notion of rest, or position so far as involving rest, as precisely the opposite of motion itself.¹ As with motion, so with other changes: the fact of change is not exhausted by pointing to that which was as contrasted with that which is. The change proper consists not in this, that A gives place to B, but in this, that A becomes B, or that which was A turns into B.

Now, to apply this distinction to the subject before us. As long as we contemplate A and B as two statical aspects of reality, we cannot see in A any ground of B. The only thing which A can as such determine is precisely A, i.e. its own continuance; and if A changes into B, it must be in answer to some prompting E. A, of course, may be one condition of B; for E acting on anything but A might produce b or β , or X or Z. But A cannot be the total ground of B. And it would seem we might push this further. Whatever antecedent we

¹ Contrast Rühl, *op. cit.* vol. II. pt. II. p. 35; and Spencer, *First Principles*, pt. I. chap. III. Mr. Spencer's argument, that a moving body in coming to rest must pass through all intermediate velocities, is a more complicated example of the fallacies of motion. Such a body is not only moving but changing its velocity, and while this goes on it has no constant velocity at any one moment, but a velocity which is itself changing from greater to less.

take, such as A E, we must ask, can it be the total ground of B? and we see that it can be so in one case only. A E must, in short, be a process in the direction of B, be a phase in something which is turning into B. For if A E is either a statical condition, or a phase in any other kind of process, it cannot give rise to B unless some further fact modifies it; that is, it cannot be the total ground. And thus we may be sure that we have not got the full ground of any effect until we have found that which we can see or conceive as turning into the effect. It is true that we have to accept many sequences empirically without understanding them; but if we cannot get direct evidence for the nature of this process, we invent hypotheses to assure ourselves that there are at least ways in which the antecedent may become the consequent, and we then feel that there is no *a priori* impossibility in our result, only that its complete character still requires to be worked out. Thus it was reasonable on inductive grounds to connect thunder with lightning, although in the ignorance of the laws of electricity and of sound there seemed no "connection," i.e. no process leading from the one to the other at all. So, again, at the present day we are certain on inductive grounds that a little pressure applied to the eyeball will cause a sensation of light. We cannot, we admit, in the least "see why"; i.e. we cannot in detail detect the process by which the one set of facts becomes the other, and we try to reconstruct parts of it, at any rate, by suggesting that the stimulus causes a molecular disturbance (whatever that may be), which again is propagated through the optic nerve, and so on. Here and there we confirm our suggestions by experiment, but all along the hypothesis is in advance of the experimental facts, its function being to render the process, as we say, "conceivable," i.e. to substitute in thought the continuous change which we are sure must be the real truth for the jumps which at present are all that appear.

(c) We may draw two inferences which affect our inductions. On the one hand, if we find in experience a process in which one thing is given as turning into another, that process may be universal. We cannot certainly say that it is so; for as with the continued identity so with the change, it may rest on surrounding conditions. We can only say that, so far as the process itself is concerned, it gives us no ground to think that such conditions are required; and therefore, in the absence of other evidence to the contrary, we expect to find it repeating itself in other cases universally. But secondly, given the process A - B, in which A appears as becoming B, A it would seem must at least be an essential element in the totality which

is here the ground of B. For that total ground must be a process which becomes B, and must therefore either be A or include A. The only alternative is to suppose two altogether different processes simultaneously ending in B. But this would be a coincidence which, apart from quite extraneous grounds, would fall to a mere unmotivated possibility. The mere fact, then, that a process is given as a process is evidence that its beginning is at least a factor¹ in the production of its end.

Continuity, then, whether in sameness or change, has a bearing on universality of connection. It is, we may say, *prima facie* evidence for a true universal. The given, whether persistent or continuously changing, is generalised in the absence of reasons to the contrary. But there is against this always the general consideration that concomitance, positive or negative, may interfere; and all, therefore, that this method taken alone can establish is, (a) in the case of persistent identity, that the content persists in the absence of changes positively determining a contrary state; and (b) in the case of continuous change, that the process is at least a factor in producing the result; while (c) as an important negative result it shows that no antecedent can be a condition unless an element in a total process of change in the direction of the consequent. The filling up of these results falls, as we shall presently see, to that consideration of concomitant facts which we call the Method of Agreement.

These rough considerations explain *inter alia* the difference in our attitude to processes which we can actually see taking place, or substances and qualities which we watch at rest, and on the other hand facts temporally contiguous but not otherwise bound together. The first set present themselves as obviously connected. The objects of ordinary life—table, chairs, cats and dogs—thus present themselves as connected wholes; and it is only positive evidence of their destruction which forces us to admit that the connections are not absolute, but rest at least on certain negative conditions. We do not strictly infer these substantial connections from many repeated experiences. They are more properly contained in a single observation, and further experience tends to limit rather than exalt them. So is it with many processes. Water becomes ice, a moving body continues in one direction, or again gradually comes to rest, sugar or salt is dissolved, a fire blazes up and gradually burns itself out; in all this we begin by seeing connected process, and the conditions and limits in concomitants outside the process come later. Conversely, a

¹ The term factor is more fully explained below, p. 349.

"mere" time sequence strikes us *primâ facie* as casual. It is only superstition, or irrational association, which jumps at once to a connection between the comet and the death of Cæsar. We require repeated evidence to convince us that the rubbed sealing wax really attracts the pith ball. With the methods of treating these "conjunctions," and so supplementing the inferences just mentioned, we have now to deal.

(2) *The Method of Difference.*

(a) At first sight this appears as an immediate deduction from our inductive principles, giving accordingly (if the truth of the principles be admitted) an universal truth as the immediate result of observing and analysing a single complex body of facts. We have a certain set of facts BC; into these we introduce, or see introduced, a determinate change A; we are sure that no other change is introduced concurrently; but we note a change D in what follows. Thus we have had

BC		BC
ABC	or	ABC
DBC		DC

This is the case of the method in which a change is introduced into an otherwise quiescent, continuous state of things, and a further change supervenes, either adding a new character or modifying those already in existence. Thus a billiard ball is moving steadily in one direction (BC). Another ball from behind impinges on it (A) and drives it on in the same direction (BC), but faster (D). Or the second ball impinges on the first at an angle (A), and the first ball moves on in a line (DC), which is a resultant of its original force + that newly acquired.

Or again, instead of introducing a change into a single continuous fact BC, we may have two facts ABC and B₁C₁ alike throughout but for the presence of A. Then comparing antecedents and consequents we may find

ABC	B ₁ C ₁
DEF	E ₁ F ₁

Nothing is commoner than arguments based on observations of this kind. "You caught cold because you kept your wet boots on, while I changed mine." "The leaves have remained on the trees here because there has been no frost (i.e. the frost in another place compared with this is A producing the fall of leaves D)."

Now supposing A to be a definite measurable change, and supposing it to be the only change introduced, have we not got a case in which our axiom may be applied immediately? We have

ABC	BC
DEF	EF

Now consider this case in the light of our principles of reasoning. Comparing our two consequents, we find a difference D. This difference must be due to a difference in the antecedents. But the only difference is A; that is, D is due to A. A thus, according to our principles, must be such as always to be followed in such a context by D. For if there is a difference in the consequent there must be such a difference in the antecedent as is always in such a context followed by such a difference. We must not exaggerate the result of this argument. Granting its premisses, it claims to prove that A brings about the change D in this context. A introduces the change D into EF. But would it have the same effect upon any other context GH. In other words, is A by itself the whole cause of D? Granting it to be the only change preceding D, we have certainly proved that the cause of D is not in BC *alone*. But have we proved that it is in A alone? Suppose that A is the lighted match and BC the gunpowder. A will be the only change introduced into the otherwise quiescent BC, and an explosion will follow. But a lighted match no more causes an explosion without gunpowder than gunpowder without a lighted match. In fact, in this case A (the change) acts on B or C or both to produce D. D's universal is not in B or C alone, nor in A alone, but in AB or AC, or even in ABC. Nor can the method of difference help us any further. It cannot of itself determine in any instance whether B or C or both are among the conditions of D. Nevertheless it has proved something of importance; it has shown that in the case ABC, A is a condition of D. Or, if you like, in the case BC, A must be added in order to get D.

It may be asked whether this adds anything to our knowledge. The whole DEF must (by the general axiom of reasoning) have the whole ABC as its universal.¹ That is, given ABC we shall always have DEF. So much would be clear without the comparison of BC - EF. What is gained? For the purposes of direct and immediate and certain generalisation, nothing. We can say, if A is introduced into BC we shall have DEF instead of EF, but this is only a longer way of saying what we knew before—if ABC then DEF. We cannot make the wider generalisation, "if A then D." But for more indirect purposes something is achieved. We begin to know the nature of the connection between A and D. Granting the

¹ For either ABC must be the total immediate antecedent, or if there are other antecedents PQRS we must have previous knowledge that those are immaterial. Otherwise the method does not work at all. We shall recur to this point shortly.

relation $ABC - DEF$ universal, we know nothing of the nature of that connection. We have two complex facts that are connected. But why are they connected? Which are the elements in them that go together? Does A, B, or C go with D? So far we cannot tell, and hence we have no opening for explanation and confirmation by comparison, the importance of which we shall see presently. But apply the comparison of the negative instance, and you begin to trace the simpler elementary connections from which the concrete fact of sequence is built up. A is at least part of the cause of D, while BC without A determines EF.

The expression "part of the cause" demands a word of comment. We think of the cause as the totality of conditions, and hence of a "part of the cause" as one or more of these conditions. But the word condition tends to be equivalent to the *conditio sine qua non*, the antecedent without which the consequent cannot be. But if we admit the plurality of causes, we cannot speak even of the total ground as a *sine qua non*, since there may be other total grounds. We can only say that it is one of a group *sine quibus non*. And if we come to a mere element in such a ground its importance seems still further diminished. You cannot say either that the consequent will always follow it, or that the consequent always presupposes it. If (in our old instance) a spark causes this powder to explode, another may be exploded by detonation. But it still remains that under the circumstances of the first explosion the spark was an essential condition. That explosion would not have taken place without it; while, conversely, given the spark along with certain other facts the explosion must follow. We may say then, that there are certain total grounds of an explosion in at least one of which a spark is an essential element, and we may express this by calling the spark a *factor* in the explosion. Or we may continue to call it a condition as long as we distinguish between condition as meaning factor and condition meaning *conditio sine qua non*.

This being understood, it will be seen that in the method of difference we have got evidence for a direct connection. As long as $ABC - DEF$ are related in the concrete, there is no evidence to show which is directly and which indirectly connected. However probable some connection may be made by repeated observations, no light at all is thrown on the nature of the connection which, as we shall see further on, is the point of first importance. Now, on that point our present method begins to give help. Within this context A is a direct condition of D. That is something gained giving us ground to

work on. If, further, we ask what evidence there is in our promises for connecting the unchanging BC with D, we must reply that that depends on circumstances. Apart from all outside knowledge, if B or C pass continuously into D, if D is that which B becomes, the evidence is at once so strong that B and D are connected. Clearly, if you stimulate (A) a muscle-nerve preparation (BC), you cannot have the contraction (D) without the muscle. The steam (D) is clearly the product of the water (B) as much as of the heat (A). The argument from continuity holds, and we connect B as well as A with D. Conversely, if BC and D are discontinuous, this argument falls to the ground, and the only reason for connecting B or C with D is the argument from the single instance. This argument is, we have seen, weak for any given antecedent, but for the whole mass it has greater strength. It is more likely that a relevant portion of the antecedent will be found among a number of facts than that it will coincide with any one which we single out. That A is the whole cause of D must therefore remain quite doubtful, even without the argument from continuity.

But this is not all. In admitting the possible influence of the concomitants BC we must not go too far. If A produces the change D in their result, that change must, as we have seen, be due to A as such. Now, this does not mean that the relation A - D is a pure universal. If it did we should have no further difficulty. But it *does* mean (according to the reasoning of Chap. VIII.) that A as such produces some δ , such as in combination with EF (the true effect of BC as such) gives the total DEF; or, to put the same thing under another aspect, some δ which becomes D under the influence of BC or in combination with their effects EF. Thus the explosion (D) did not follow as such from the lighting of the match (A); but we are bound to think—and the physical hypothesis of the "nature" of heat enables us here to give some form of expression to our thoughts—that the lighting of the match (A) has certain molecular changes in its immediate environment (δ) as its necessary consequent. These changes modify in some degree the state (EF, GH) of whatever the substance in contact with the match may be. But as is the system of molecular arrangements into which this modification is introduced, such will the result (DEF, ΔEZ) be. The change (δ) is not to be regarded as an event in time interpolated between A and D. It is the common characteristic which can be analysed out of D and Δ in a favourable case, and which must be postulated when analysis does not reveal it. And however different D and Δ

may be, they must be such as to be constituted by the introduction of δ into their context.

The discovery of δ remains a problem for which even the best analysis can only give a hypothetical solution, but the consequent D, discovered in this instance, is one of the data for determining it. And, whatever δ may be, it must bear some relation to D, and one mode of its behaviour is illustrated by D. The method, then, throws light on the universal consequence of A, though it does not by itself determine it as a demonstrated result. On the other hand, we can see at this stage that a single generalisation combined with the method of difference may at once give important universal truths. For if it be known that neither B nor C can produce D, *nor any element* in D, except in such a way as the observed facts render impossible, the relation A-D must be universal. An instance will make this clear. Let A ($=a' + a''$) be a substance or pair of substances, say equal volumes of hydrogen and chlorine. Let them be placed in a vessel (C) and be exposed to light (B). The two substances combine and form an equal volume of hydrochloric acid (D). Now, we have no right to say that either B or C is without influence on this result. In fact, B, the exposure to light, may be taken as necessary. But let the question be, what elements compose hydrochloric acid? as distinct from the question, what causes these elements to combine? and we have a simple generalisation which will at once give us our result. A substance never gains or loses weight except by transfer of its parts to another place, or transfer of another's parts to itself. This we shall see later to be a simple generalisation founded upon wide experience. Now, the acid is equal in weight to the hydrogen and the chlorine. The glass (C) retains its weight unaltered, and has therefore parted with none of it to the acid. The light (B) is not material—bodies do not get heavier by being illuminated. Hence in *this respect* the results cannot be affected by B or C. Either of these concomitants might affect the change *quâ* change. For a substance such as the sides of a vessel may facilitate or prevent combination or decomposition, though itself unchanged, as e.g. oxygen is given off from potassium chlorate at comparatively low temperatures, if manganese dioxide be present, the dioxide remaining unchanged. But neither the dioxide in the one case nor the glass in the other are thought of as going to constitute the substance formed, since they lose none of their weight. Given, then, these simple generalisations, that every part of a substance weighs, and that a substance can gain or lose weight only by the opposite change in another substance,

and every experiment in determination of the composition of a substance is reduced to the simple method of difference or deductions therefrom. Hence to the chemist the success of an experiment for this purpose is only a question of having the substances "pure," i.e. knowing precisely *what* the substances

(b) But in all this discussion we have made an assumption which must be admitted and justified if the value of the method is to be sustained. We have spoken of A as the single change introduced into the context BC, assuming that beyond ABC no further concomitants are in question. Thus we apply a test (A) to a substance (BC) and get a reaction (D). But by what right do we limit our view of the antecedent to ABC? We say, that these are the *immediate* antecedents of the change, and that the cause must be found among such as are immediate. But what are immediate antecedents? Those directly continuous in time with the effect? In this case the whole contemporaneous state of the universe will be relevant and must come in for consideration. Or those which are both spatially and temporally in continuity? This is plausible, but it is clear that in many cases which are regarded as causal relations, and established by this method, the spatial continuity if it exists is not made out. To explain gravity or the transmission of an electric current or a nerve stimulus by a continuous propagation of a disturbance from its initial point may be very sound, but involves at least this, that we postulate changes which in themselves are unobservable. Hence a new difficulty; supposing we had the whole phenomenal world in our mental scope, and could find in it no change save one, there would still remain the world that lies beyond our powers of observation, a world the existence of which rests on inferences from observation just as strong and good as any that we can make on the methods now before us.

Our difficulty, then, is with the question how to prove any given change the sole change which precedes the given effect. On the one hand, there is the whole state of the universe in which, as it would seem, we might find a relevant change. On the other hand, if we insist that any change must be in continuity with the effect, there is the difficulty that the series of modifications constituting such a continuity may be beyond the scope of our observing powers.

We might eliminate some of these difficulties by a series of negative inductions. Simple observation of a single instance will give us a negative though no more. If I find change D without P, I conclude that P is immaterial, and I may repeat

this process an indefinite number of times. No doubt, in fact, this is more or less consciously done. And we must come to the method of difference in some degree prepared by previous knowledge of this kind. The "similarity of circumstances" postulated by the method of difference "needs not," Mill remarks, "extend to such as are already known to be immaterial to the result. And in the case of most phenomena we learn at once, from the commonest experience, that most of the co-existent phenomena of the universe may be either present or absent without affecting the given phenomenon." So far we merely help out our method by bringing it into relation with other and simpler considerations.

But it is impossible to see how such a process could be exhaustive. We may grant that it has operated—that it is always set in operation—against any definite suggestion of an alternative. And there is perhaps no suggestion so fantastic that it may not either be made by men or tested or disproved by this method. To go no further, we might well suppose a mediæval experimentalist taking great care to observe the position of the stars before embarking on his experiment.¹ And if we now dismiss a "concomitant" of this kind with contempt, I imagine that the change of attitude is due to actual experience, showing that the course of the world pursues its way regardlessly of planetary influences.

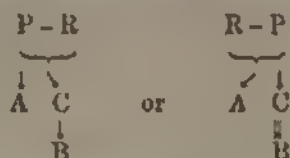
But though we may negative this or that suggestion, how can we get rid of the comprehensive doubt suggested by all that we know of reality—of the subtle and multitudinous intermixture of sequence and sequence? In stating the method of repeated observation of changes in definite relation we saw at once that any changes so repeated must be in some way connected. They must, to put it at its lowest, have a common cause. The contrary supposition is at least improbable. Now, in the former method we never went on to inquire whether there were other changes or not. We noted the possibility that there might be such, but did not discuss how they were to be found. To that discussion the method of difference compels us.

A and B are changes twice or thrice repeated in a definite relation of space and time. This will not happen unless either A determines B, or falls in each case into a precisely similar

¹ Like Chaucer's doctor of phisike—

"For he was grounded in astrononomie,
He kept his patient a ful gret del
In honour by his magike naturel.
Wel coude he fortunen the ascendent
Of his images for his patient."

relation with some C which determines B. Now take the suggested relation of A and C. It, again, is very improbable, unless A and C are due to a common cause as P. Then we have P acting, say on R, the general permanent characteristics of the given area of reality, and producing both A and C. Thus—



Now, if attention be not directed to the discovery of C nothing can be said against its existence, and cases could, of course, be adduced of such a combination of sequences as that figured above. C therefore may be regarded as not improbable. But now turn observation to the concomitants, and what follows. We do not find C anywhere. That is, it is either unobservable or escapes our notice. What ground, then, can there be for asserting it? There seem to be three possible grounds. The first is, some previous knowledge of B, or b and *S* effects similar to B, which makes us disinclined to believe that A can be the cause, or inclines us to expect some contributory change of a kind that would escape our notice. But the possibility of maintaining this ground must depend on the second objection, that P, the cause of A, is such as to produce some C also. Thus a "localisation experiment" is always open to the objection that the stimulus used may affect some other area as well as that primarily stimulated. And lastly, both these criticisms are tested by the third ground, which is simply a negative instance of A without B. If A, being the sole observed change, is after all not always followed by B, it is clear that the real cause was some unobserved condition not present in the new case. The records of many a localisation experiment would supply instances of failures of this kind.

The first business, then, of an experimentalist, employing the method of difference to support a controverted point, will be to consider cases approximately similar to his own. If from them he finds reason to suppose a further change beyond that which he notices, he must weigh this ground against his own result. Supposing such ground to exist, he is not altogether without resource. If a specific suggestion be made he can take specific precautions to remove it. Thus, in determining the rate of transmission of an excitation along a nerve, reliance is placed on difference in the latent period in two experiments on the same nerve. But it may be urged that the

certain but unobservable molecular changes accompanying the inevitable disintegration of an excised nerve may interfere with the result by modifying the excitability. To eliminate this, the order of the experiments is reversed. So again if the alteration of excitability by the previous experiment be urged, or the effects of temperature, or any other concomitant that may be suggested. In this way definite and well-grounded suggestions to the contrary are removed, and any further suspicion of a concomitant must rest on remote analogies from distant cases. But now these analogies, or the stricter parallels already discussed, can only rest on the presumption that the cause of A is such as in each case to determine C. And for this once more there must be evidence. It does not matter for this purpose what A's cause may be, whether it is a combination of circumstances or a single fact, whether it is exactly alike in both cases or different, in either event it must produce C if C is to exist; and if there is no ground for assuming it to do so, C must not be allowed to have any positive degree of probability.

(c) Now, suppose there is ground, small or great, for suggesting that P, the cause of A in a given instance, is also followed by C. There are two main ways in which such a suggestion may be met. If a physiologist stimulates (P) a brain area, and supposes the excitement of that area (A) to cause a given reaction (B), his inference is open to the practical objection precisely corresponding to that now suggested on the grounds of pure theory. It may be said, that is, that the very stimulus P set up a change in a different area E, and the change in E was the cause of the given reaction. Now, three methods of answering this objection are open to a physiologist. First, if a special area E be suspected, he can isolate it by section or other means. But since we have to deal with a general and not a special suspicion, this method does not at present concern us. Secondly, he can use a different stimulus F or G (e.g. absinthe instead of electricity, or mechanical pressure in place of ether). Thirdly, he can perform a mask or blank experiment, imitating the first in such wise that he repeats P without introducing B.

I consider the last method first. I wish to prove that with a low potential contact is necessary to complete the circuit. I judge of the said completion by the deflection (B) of the galvanometer, then the observed contact is A, and P will be the approach of the electrodes moved, say, by my fingers. Now, first, P passes continuously into A—I bring them nearer together until they meet. At any point, however, it is in my

power to stop them—thus I can bring them indefinitely near without allowing them to touch, and if in this case no deflection results I am justified in saying that P as such does not produce B except through A, or P only causes B if it first passes into A.

Two objections may be raised here. It may be urged that my solution is self-contradictory. If P is the cause of A, I cannot have P without A. This is strictly true. There must really be some difference Δ in the present case. But a good negative induction may convince us that Δ has nothing to do with B. Thus in the present instance the only "difference" is in my movements which cause the electrodes to approach so near and no nearer; but that the movements of my fingers, apart from those of the wires, produce no effect is an obvious "induction." And so in many other cases.

Speaking generally, if the difference between P and P_1 is only, so far as observation goes, that P produces A and P_1 does not, then, since B follows in the first case and not in the second, A must be the cause of B. Thus if an anterior root be cut (A) the motor paralysis resulting (B) might have been attributed to effects (C) of the wound (P), which must be made to reach the root. But if a precisely similar incision (P_1) be made, save that it stops short at the root, there is no ground to suppose that its effects differ in any particulars except those under observation, and thus we argue that section of an anterior root produces motor paralysis in the area affected. Similarly with the discrimination of the functions of the roots, and indeed with almost any other physiological experiment we like to name.

It may be objected, secondly, that in the process from P to A we can only get indefinitely near to A. The answer to which is, that this is only an instance of the general fact that we get no ideal similarity, equality, or anything else, whence we never get ideal accuracy. In any method we can only get approximations, and when we call a method perfect it is merely by arbitrarily overlooking its roughness. Show me a method that gives roughly accurate results and you show me a roughly good method. Show me one whose results are indefinitely near accuracy and it is itself indefinitely near perfection. In this case we have a sufficient result if we know that a process approximating indefinitely close to A in time, place, and character is the cause of B; we have an indefinitely small range within which to find the cause. In the above case, for example, it is of little moment whether absolute contact or indefinitely close approximation closes the circuit.

There are, of course, instances where the difference becomes important, namely, wherever A stands for a process of some extent. Here the experiment proves that the passage from P to A, say to the beginning of A, causes B, but it does not disprove the possibility that the initial step of A should set some other process in motion which should produce B. Thus, in the experiment first instanced here, it would be absurd to doubt that the stimulation of the brain caused the reaction; for if we stop the process at any point anterior to the actual stimulation, the reaction does not take place. What is practically in doubt is whether the stimulus once effected may set up a secondary disturbance in a different area. This doubt can only be removed (on the present method) if we can stop the process of A at some more advanced point, and find that B no longer results. This might be done, for example, if we could destroy the connection of the area stimulated with the reacting muscle and find that the contraction no longer took place. Here, again, there would be the doubt whether the means taken to prevent A did not also interfere with the secondary disturbance; but, in the absence of special reasons for the suspicion, such double interference would be fortuitous and improbable in proportion to the variety of means used to effect the result.

In these cases, then, we apply what we may call the elimination of the antecedent in order to perfect that of the concomitants. This can be brought indefinitely near perfection in cases where the immediate observable antecedent A is of definite character and brief duration; but when an appreciable continuance of A is necessary, the inference can be applied in its full strength only to the initial stages of A, though some degree of probability may be obtained that the whole of A is concerned in producing B.

(d) A second method of proving the point before us introduces us in effect to the method of agreement, but as certain special circumstances facilitate the application of the method here we may treat it separately. If it be suggested that P causes B without the intervention of A, we may substitute for it other antecedents, Q R S, which give A equally well. This is done by physiologists, when they effect the same stimulus by chemical, mechanical, or electrical agencies; or by electricians when they vary the material used as a conductor or generator; or in mechanics, when almost indefinitely different systems of forces with the same resultant produce the same effect. Now, if P is open to suspicion, is Q in the same case; and if Q, are R and S also suspect? If not, if there is no evidence in any one case for the production of C, we must not regard the

suggestion of C as worth anything, and it remains that A is the sole change.¹

We have dealt in detail only with the suggestion that the unobserved "C" is introduced by the cause of A itself. It is of course also possible to suggest that A merely "happens" to coincide with C (which is the true cause of B), i.e. the connection between them is too subtle and intricate to be traced. We should reply that such a coincidence is improbable, and that the oftener we find the relation in fact the less likely is it to be a mere coincidence. But do we on these lines reach demonstration? We might say that, at any rate in a large average of cases, the chances of coincidence will equate themselves; if they are really disconnected, we shall find A without B by looking long enough. But what, it might be rejoined, is a large number, and when have we looked long enough? May not the field of our observations (a sceptic might urge) just coincide with our set of coincidences, so that our deception might continue indefinitely. We can only reply adequately to this question by turning his own weapons upon the sceptic, and demanding the ground of his scepticism. Why should there be an unobserved concomitant C at all? On what ground is it suggested? If our general theory of inference is correct,—and for the present we are assuming it,—the suggestion can be grounded only on some parallel fact of observation. If a content like the suggested C were known to cause B in another case, there is ground to suppose C here, though

¹ An example of some present interest will illustrate nearly all the points we have mentioned. Difference in the weights of "nitrogen" from atmospheric and chemical sources (B), suggests as its cause (A), the presence of some heavier foreign substance in the "atmospheric nitrogen." Other alternatives at first seemed possible. It might be that the lighter nitrogen contained hydrogen, or that its molecules were partially dissociated. These "grounded suggestions of an alternative" were found incompatible with various facts. Then did the method P of preparing atmospheric nitrogen produce some impurity—our unsuspected concomitant (C)? As to this, first of all, three wholly distinct methods were employed (our P, Q, and R). These were the "parking" of a volume of air which left a residue that could not be nitrogen; the withdrawal of nitrogen by means of red hot magnesium, and lastly, withdrawal by atomization, which proved that the more nitrogen diffused away the heavier the residue became. It was argued that the same error could not arise in all three methods (our variation of the antecedent). Finally, the chemical methods of treating atmospheric nitrogen might produce some impurity. They were tested with chemical nitrogen, and it was shown that this could not be, at least on the scale required (our elimination of the antecedent.) The cause of the difference originally noted was then inferred to be the presence of argon in atmospheric nitrogen. The peculiar difficulty of the case was of course that the cause could not here be directly observed, but this does not affect the logic by which the possible interference of concomitants was eliminated. See *Nature*, 7th Feb. 1895. I am indebted to Mr. W. W. Fisher for drawing my attention to this example.

unobserved. If there are analogies in experience making it unlikely that A should be the cause of B, that again is a reason for suggesting that the true cause escapes our observation. If these and all such grounds fail, there remains nothing but a bare possibility, which can be grounded only on the knowledge of cases in which unobserved facts have played their part. Such a ground might be strong if the cases known were similar to the case in hand. But such grounds we have already supposed to be discussed and dismissed. The mere fact that in some other case, however different from the present, an observed concomitant happened to coincide with an unobserved cause is the only counter consideration that remains. It is a bare analogy, in which the point of similarity is reduced to this, that "facts" or "phenomena" and their "relations" are being dealt with. Still, it gives a bare possibility of error.

But this is not all. We argued above that the coincidence A - C would not occur frequently, and that in consequence, if we found A - B constant in a large number of instances, we could assume that C was non-existent. It was suggested, in reply, that the cases observed might happen to be those in which A and C coincided, i.e. in effect that the field of our observation might be unfortunately situated for purposes of inference. Of this suggestion we have again to ask whether it has any ground. We are all aware that "casual coincidences" from time to time take place which, if not guarded against, might lead to false inferences. But for this very reason we repeat our observations, to "eliminate chance," as we put it. How far repetition must in practice be carried for this purpose is a question which experience itself in fact determines. If experience shows us that a few instances are in fact adequate, that is as much as to say that we know no case of failure (from the cause in question) when the specified number of instances has been taken. Hence, to doubt an inference so guarded is to doubt without ground. In no case, on our principles, can a generalisation be questioned on the strength of a suggested concomitant beyond the sphere of observation, unless an instance can be produced of an equally strong generalisation which has turned out false for this reason. The tests which a science comes to prescribe for itself are valid precisely because it has learnt from experience of success and failure, that it is practically necessary to carry its tests to that point and no further. We shall deal further with the test of success at a later stage. At present we only insist that the ground of doubt and the limit of doubt alike rest on experience, and to

doubt the test which experience confirms is to doubt without reason.

To sum up. The first object of our method is to prove A to be the sole change antecedent to a given result. To prove this, it must meet all analogies which would indicate that A may be associated with some further unnoticed change. If it disproves the stronger of such considerations, it will have a probability proportionate to the weakness (i.e. remoteness or intrinsic uncertainty) of those which it is unable definitely to disprove. If (say by repeating our experiment and varying the means used) we get a case of a type in which no failure is recorded, no counter suggestion can be made with any appreciable degree of probability. In such a case the result is indefinitely near to certainty. In any case, whether certain or probable, the method shows, not that A is universally followed by B, but that it is necessary to it in this context, that is, it is here a factor in the production of B.¹

¹ The above account admits in part Mr. Bradley's criticism that the method does not directly prove the antecedent to be the total cause of the consequent. It proves that A causes B in such a context as the present, but not that it does so universally. It is a mistake to suppose that Mill was ignorant of this limitation, as his canon merely states that under the conditions prescribed by the method A will be "the cause, or an indispensable part of the cause" (*Logic*, bk. iii. chap. viii. par. 2 fin.). This last expression requires, however, a further word of explanation. What it really means is, that the effect of A is at least an element in the construction constituting B. If, for example, this element can be supplied by a different antecedent, as C, then A will not be indispensable. We have expressed this by calling A, not a "condition," but a "factor" in the production of B.

The question before the present method is not whether A is the sole cause of B, but whether it is a cause of B. And for this reason Sigwart's criticism (*Logik*, § 85) is certainly out of place. Taking Mill's instance of death following a shot through the heart, he points out that this does not prove that the cause of death is necessarily a shot through the heart. Of course it does not, but it is not intended to do so. The present method does not claim to give inferences from effect to cause, and why Sigwart should require it to do so does not appear. Admitting, as he appears to do, that it is suited to the discovery of the effect of a given cause: *diese nur gezeigtes ist, zu einer gegebenen Ursache die Wirkung zu finden*, he ought to have admitted it as a sound inductive method, however limited by the "difficulties" of complete elimination. It is strange that Sigwart, two pages below par. 11, vol. ii. p. 123, states an elaborate formula as ground for belief in causation, which he tells us in a note corresponds to Mill's joint method. In reality, an attentive reading will show, it formulates the two instances required by the method of difference alone. Sigwart appears to have confused the "positive" sides of this method with the varied instances of the method of agreement. His own formula, then, is really a testimony to the value of the method of difference.

Mr. Bradley's other criticisms do not seem to me so important, and as I have endeavoured to meet them elsewhere (*Mind*, O.S., No. 55, I do not recur to them here.

CHAPTER XV

SCIENTIFIC INDUCTION (*continued*)

(3) *The Method of Concomitant Variations.*

If we compare several antecedents of similar quality but of different quantity or degree, and find that their consequents vary in a similar fashion, what inference may we draw as to the connection between them? If *a* and *b* vary together so that we have, for example,

	<i>a</i>	2 <i>a</i>	3 <i>a</i>
	<i>b</i>	2 <i>b</i>	3 <i>b</i> , etc.,
or again,	<i>a</i>	2 <i>a</i>	3 <i>a</i>
	<i>b</i>	4 <i>b</i>	9 <i>b</i> , etc.,

what evidence is this for a general connection of *a* and *b*?

To be clear on this point we must at first avoid treating the present argument as a special case of the Method of Difference. If, comparing the cases *a* and 2*a*, I find *a* to be *the only fact* that has varied, I infer the connection of *a* and *b* on the principle of the method of difference. If it is true that *a* is the only change, then clearly it is the addition of *a* that causes the addition of *b* in the consequent. This represents, in fact, that case of the method of difference in which the antecedent cannot be wholly eliminated—or to put it more accurately, when the varying antecedent is not a quality appearing in the one instance and disappearing in the other, but a variation of the same quality as between the two instances. This case is in practice frequent enough, but observe that so far we have got no new principle. We have not connected quantitative variation *as such* with causal connection, but only such quantitative variation as appears in cases where observation reveals no other concomitant changes. Abstracting from such observation of concomitants, we have now to ask what evidence is concomitant variation *as such* in favour of causal connection? Supposing *a* and *b* to vary as above while nothing is known of their concomitants, can we connect *a* with *b*?

If *a* appears frequently in a similar relation to *b* it becomes

speedily improbable that the relation should be casual. But if, further, a and b vary in every case upon a single principle—whatever that may be—the improbability becomes indefinitely great. It is equally improbable that there should be more than one “reason” for such a series of coincidences, for any two reasons or antecedents would not coincide in their effects all along the line. Hence it is indefinitely probable that concomitant variations are due to a single cause, i.e. either the variations of a cause those of b , or both depend on the variations of a common antecedent C .

Which of these two alternatives is the more probable will depend on the nature of the variation observed. We can understand this best by assuming, first, certain forms of connection between an antecedent and consequent and seeing what follows. Let A and B be two general qualities, of which a and b are units, and assume first that these are so connected that the consequent of a as such is b . Then we must have a simply proportionate variation

$$\begin{array}{ccccccc} a & 2a & 3a & \dots & na \\ b & 2b & 3b & \dots & nb \end{array}$$

expressed by the equation $b=ma$ (when b is the degree of B present in any case, and m the number of units a of the quality A preceding). This follows from the hypothesis, for if the effect of a as such is b its effect cannot be modified by the accompaniment of another a : hence $a+a=b+b$, and so on for any numbers. In fact, this relation is expected and found whenever a is the strict total cause. Thus, as Jevons points out,¹ it is true of accelerating forces, of the proportion of mass to weight, of the conversion of substance into other forms, or of energy in different manifestations. “Whenever, in fact, one thing is but another thing with a new aspect, we may expect to find the law of simple proportion.”² But on a true view of cause and effect these are just the cases—though we may take exception to the form of expression—where we have a true and final account of the universal relation.

Conversely, if the correlative variations follow any other law it is difficult to see how we can have a direct and exclusive connection between A and B . If we have

$$\begin{array}{ccccccc} a & 2a & 3a & \dots & na \\ b & 4b & 9b & \dots & n^2b \end{array}$$

we certainly cannot have b depending on a as such. For the action of each a is modified by the presence of other units of a . But, further, it does not seem possible that the total ground of B should lie within A . For if it did, then in the simple case

¹ *Principles*, bk. iv. chap. xxii. vol. ii. p. 126 ff.

² *Ibid.* cii.

$a - b$ the total ground of b must lie in a , and we are reduced to the previous case, which is impossible. We are led, therefore, to the view that when the variation is not simply proportionate a further fact as C (which may be constant or variable) must affect the changes in degree of B .¹ Now, where such further condition is at work the results may be very various. If *only* C affects B , at least two things may happen: (i) C may be indifferent to the quantitative character of B . Then we get back to the old result—simple proportion. Thus an electric current (a) acts on a metal (C) and dissolves quantities directly proportionate to the quantities of electricity which pass.² Or (ii) the effects of A and C are, as such, conflicting; but b , the result of a acting on C , includes in itself a modification, c , of C , which persists as a point of resistance to a further application of a . The "force" of c may be greater or less than that of C . If greater, the increase of B will be less than proportional to the increase of A ; if less, greater. Thus compressing a spring (C) with force (a) a movement (b) results. This movement involves a modification (c) of the tension of the spring, which in this case gives it greater power of resistance to a fresh application of a . Hence the force $2a$ will produce a movement less than $2b$.

Thus in the simple case where there is only one condition other than A which affects B , the resulting variations may follow very different laws. Of course, further complications arise where (say) a high degree of A brings a wholly new condition D into operation. Thus we may have diminishing returns from the application of capital to land up to a certain point. But if a much greater sum is brought into operation for extensive drainage works the returns may "increase" again. We need not follow these complications further, but may put together our results up to this point.

1. True and complete causal connection gives quantitative variations in simple proportion.
2. Incomplete connection gives variations following laws of all kinds.³

If now we make no initial assumption as to the nature of the connections, but ask what can be inferred from the facts of concomitant variation themselves, we see that in any case under the second head we cannot go beyond the argument

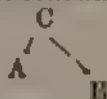
¹ Cf. Sigwart, § 25, par. 20. We may, as he points out later (par. 25), in some degree use this result for purposes of elimination in the method of agreement.

² Jevons, *loc. cit.*

³ And of course the law would not always be the same for different degrees of the qualities considered.

already adduced. It is improbable that two series of variations should uniformly coincide as the result of a combination of independent causes, and we expect therefore to find a single cause, or at anyrate a connected set of causes, to "explain" the phenomena. But we do not expect the cause of the variations of B to lie in A alone, and how the remaining antecedents C and D are related to A, what they are and how they themselves vary, can be but slightly indicated by the facts in the absence of further analysis or antecedent knowledge.

Passing to the first case, let us consider the alternatives. A and B vary in simple proportion. Then (as before) it is probable that either A is the cause or a factor in the cause of B, or that they both depend on some fact C. This will in effect mean that we have the following—



Against this scheme in the abstract no cogent reason can be alleged. Hence the bare fact of concomitant variation taken by itself proves only some connection, but not direct causal connection. But if now we introduce the consideration of concomitants, and find that A is, so far as observation goes, the only fact which varies concomitantly, the suggestion that C exists will be unmotivated; and we shall have ground for supposing A to be at least a factor in the production of B.¹ In the same way the present method may have a negative value. If a fact D is always associated with B, this is a ground for connecting them. But if D and B do not vary concomitantly, D cannot be the whole cause. In these ways concomitant variation may prove, or contribute to proving, an antecedent to be at least a factor in the cause of a consequent.²

(4) *The Method of Agreement.*

Granting the method of difference everything that we have claimed for it, it gives no generalisation in the proper sense of the word. Granting A to be the condition of d when BC are present, it is still uncertain whether D will follow A in other cases. Hence there is no generalisation beyond the

¹ The principle now used is nearly, but still not exactly, similar to that employed by the method of difference. There we demand that no concomitant shall be introduced along with A. Here we require that no concomitant shall vary in the same proportion with A and B.

² Much stress has been laid by S. Stuart (*Logic, loc. cit.*) on proportionate variation, and his account is suggestive and interesting. But he does not seem to take sufficient account of the alternatives to direct causation as possible explanations of the result.

Mull's method of concomitant variations is, properly speaking, eliminative.

broad connection of *d* with *A B C*, which could be inferred from simple observation without comparison. We have admitted this; but in admitting it we contended that the point proved would turn out to be of importance in subsequent operations. We have now to justify this contention, and with that view we turn first to the method of agreement as formulating the chief remaining type of inductive reasoning.

Let us first consider the method in isolation. According to its canon, we are to find for *d* an antecedent *A* which is the one point of identity among the antecedents in the instances examined. Thus we have

ABC	ABE	ACE	AEF	etc.
Def	Deg	Dfh	Dhi	

For example, there are acids (*D*) of various kinds and descriptions (*e f, f h, h i*) formed by combinations of various elements (*B C, E F*), but what is common to all these combinations is the union of hydrogen with another element or elements (*A*). All sorts of combinations of forces will move a given mass in a definite direction with a definite velocity; but if, representing all these forces by straight lines, we resolve them into lines in the direction of or perpendicular to the line of movement, we shall find that while the perpendicular lines cancel one another the algebraic sum of the forces in the line of movement is a constant positive quantity in the direction in which movement takes place. We find an albuminoid substance in every kind of living organism, from protococcus to an oak, and from a mushroom to man. In all these cases we derive a belief in a close causal connection. On what principle, and with what validity?

Let us first consider the case formally, i.e. let us take the symbols as we find them, and suppose that they represent an exhaustive enumeration of the facts to be considered. We will correct this assumption afterwards.

Now, comparing *A B C* and *A E F*, and supposing—what the symbols imply—that *B C* and *E F* have *no common element*, the argument will run, *A*, and only *A*, is common to the two antecedents of *d*, therefore *A* is the cause of *D*. This assumes that *d* has only one cause. Otherwise what is to obviate Mill's criticism that *B* may be the cause in the one case and *E* in the other? Now this assumption, as a matter of ultimate abstract theory, may or may not be true.¹ But in any case how are we to apply it? The solid fact in the doctrine of the plurality of causes is that many *prima facie* different antecedents have similar consequents, though analysis is continually

¹ See Chap. XIX.

resolving these differences into underlying similarities. Thus friction, combustion, the liquefaction of a vapour, freezing, pressure, all produce heat. What could be more apparently disparate than these agencies? Yet all of them alike involve the liberation of molecular motion in accordance with mechanical laws common to all the cases. The apparent cause, the antecedent as first observed by the senses, is in these cases rightly distinguished by Bacon as the *causa materialis* or *physica*, which is *fluxa* and *nihil aliud quam vehiculum formam deferrens in aliquibus*. That is, the particular accompaniments, antecedents, or consequents of the liberation of molecular motion all go to make up the sensible appearance of the process, but are totally irrelevant to the effect under investigation, namely, the production of heat.

We have not, however, always found, though we may ultimately always find, that all causes of the same effect contain a common element which can be asserted universally of the effect—*quæ ut cum natura data convertibilis*. But the difficulty is increased when it is understood that the common element is not necessarily an immediate sensible similarity. Similarity can be asserted not only of apprehended facts as they stand, but of contents arrived at by analysis and construction, or by these activities combined. Thus a similarity of facial expression, of literary or artistic style, is arrived at by analysis. The similarity suggested above of the mechanical antecedents of motion, by an intricate intellectual construction which may be represented by the graphic construction of straight lines.

Thus, even if we assume plurality of causes to be always resolvable into some underlying identity, it is clear that to ascertain this identity with precision may be a long, difficult, and uncertain business. Supposing it for the moment accomplished, so that A is definitely known as the only point common in the last analysis to two sets of antecedents, another objection remains. There is nothing in strict "agreement," i.e. the argument from the positive fact alone, to show that D *begins to exist* at all on the appearance of A. D may be a permanent fact. And this can in part be judged from the content of D itself. Then a dilemma follows. Either D is permanent in character; if so, it suggests that it did not arise out of A, but existed previously, and of this disproof is required: or D is given as a transitory event—a change; if so, the negative instance (absence of D) is given; we observe the rise of D out of A, and pass beyond the method of agreement into the joint method. Agreement alone therefore proves nothing

final; A may not even be a condition of D. Wherever there is sea we find sky; but we do not make sea the cause of sky, because we do not find the sky coming into being when or where the sea appears. Conversely, fire is the cause of smoke, because the smoke comes out of the fire and disappears as the combustion ceases.

It may be added, that when we talk of eliminating *all* the concomitants we forget that the great, fundamental, omnipresent elements of reality cannot be eliminated at all. All our experiments are made on the surface of this earth, all our observations are made from its surface; and if we include all historical records in our evidence, all are made within a limited fraction of a geological epoch. Let us call the necessarily permanent element in all our observations and experiments T. Then the mere observation that A - D turns up in quite diverse circumstances, BCE, FGH, does not prove a connection, for the real relation is

ABCET

AFGHT

D

D

where T is, so far, just as likely to be the cause of D as is A. In short, D may be one of the permanent facts of nature, or may be a result of them, so long as the affirmative instance alone is looked to. It is of no use to reply that we should know whether this were so or not in any concrete case. For we know it only by the negative instance—observing D to be non-existent. I infer then that the method of agreement (like simple enumeration) loses most of its value without the negative instance, and this instance must show us that D appears only when A is introduced, A being the sole point of difference.

The method of agreement proper may be said to have two applications. The first arises when the "negative instance" has already done its work, the subject being already so far determined that we know the effect not to be a normal fact independently of the suggested ground. Thus if a selective preference by the female is verified in cattle, dogs, sheep, pigeons, wild horses, fallow deer and geese, we may with some confidence generalise this power for the higher vertebrates.¹ Here the "selection" to be considered is a name for certain behaviour on the part of an animal, and the only question is to what conditions of the animal nature is it to be referred. Does it belong to an animal as such and so, e.g. to a mollusc? or does it belong only to this or that species, so that some animals possess it and some do not, as an eagle has keen sight

¹ See Wallace, *Darwinism*, p. 172.

or a nightingale the power of song? Or does it depend on a certain level of intelligence common to the higher vertebrates? This last seems roughly to be the result indicated, and this is drawn strictly from the method of agreement, the subject being such that the negative instance is not required.¹

Secondly, the method of agreement may be used when a merely general judgment is in question. If I want to discover, not whether one fact is the ground of another, but whether a certain relation between two facts will hold universally or normally, I may use the present method in isolation. It is here that the method of agreement shows its superiority to any form of simple enumeration. I want to prove something of all P. It is not enough for this purpose to observe a number, even a vast number, of instances P_1, P_2, P_3 . The careful observer takes different types P_a, P_b, P_c , and, again, p, P and π ; and if throughout such differences he finds the relation to hold, he generalises it with confidence as at least the normal characteristic of P. All buttercups are plants, and all buttercups contain chlorophyll; but I might examine a million buttercups, and on the question whether all plants contain chlorophyll I should remain precisely where I was when I had examined half a dozen. But if I examine a buttercup leaf, a blade of grass, a fern, a moss, a volvox, and a protococcus, my six observations will give me a very fair right to generalise. Normally, plants contain chlorophyll. On the other hand (this must be noticed as the weakness of a method that does not go strictly by ground and consequent), a very great variety of instances will not give me a true universal, as is illustrated by the exceptional case of fungi in the instance before us, or by the few instances in which dicotyledons are not exogenous. In any of these cases we might (if we happened not to meet the few exceptions) accumulate what would seem overwhelming evidence for a generalisation, just as if we considered the case of the human muscles *seriatim*, we might feel sure that all striped muscle is under the control of the will until we came to the solitary exception of the heart. We must not exaggerate the error in such cases. The method gives us rough truth, and is not (like simple enumeration) misleading in practical life. If typical instances have been taken, the result will be normally true, and there must (as it has been put) be "something in" the connection, though it fails of strict universality.

¹ It is not without point to remark that if the broader question of the conditions of choice in general were before us, we should advert to the negative, the fact that inanimate matter does not exhibit the phenomena of choice being of fundamental importance.

Meanwhile the deficiencies noted lead us to

(5) *The Joint Method*, which aims at supplementing both the methods of agreement and difference by bringing them together. In

BC	ABC
BC	DBC

A might not be the whole cause of D, because BC might have an influence. Similarly in

(D) ABC (T)	(D) AEF (T)
DBC (T)	DEF (T)

we did not (confining ourselves to a purely positive instance) inquire whether D did not exist already, nor could the permanent factors T be eliminated; it was strictly impossible to show that A was a condition of D at all. Combine the two methods and find

BC	ABC	EF	AEF	(T)
BC	DBC	EF	DEF	

and you get the result, that A is (i.) a factor in the production of D, and (ii.) that no concomitant is essential to the result except the permanent order of nature T. From the possible results of this background we never wholly escape by direct induction, though a combination of reasonings may partly, and perhaps with high probability, disprove its influence. We shall return to that point later. Meanwhile we claim in this method to have reached a genuine and useful universal. A in connection with the abiding facts of nature gives us D, and thus without any other condition. Once more, these permanent elements *ex hypothesi* are found to be unchanging in experience, and hence D can be asserted on the sole ground of A without limitation.¹

Thus water may be made to boil by raising its temperature to 100° C. at the sea-level, or by exhausting the air in the vessel containing it, or by a combination of both methods, as when it boils at 95° or 90° on mountains of different heights. The common point in all these instances is the balance established between the tension of the vapours of the water and the pressure of the gas upon its surface. Conversely, where this equilibrium fails, there, whatever the other circumstances may be, water does not boil.

¹ Of course, experience itself may indicate that the "permanent" changes too, and so the universal A - D, holds only with the reservation "in so far as it is applied to a sphere in which there is no ground in experience to suppose a change in the permanent elements of nature." This consideration is of no importance whatever in applying our knowledge in ordinary cases, because for them the induction (itself resting on the method of agreement, will hold, that the permanent background of nature will continue. It is of the very utmost importance in weighing the result of our inductions as a contribution to a final conception of the meaning of reality.

A frog's heart continues to beat after the death of the animal, and when excised from the body. If severed from each other in a particular manner, the auricles and the ventricle will continue to pulsate separately. If the ventricle is bisected longitudinally the halves continue to beat; if transversely, the lower half becomes motionless. In fact, as long as a part at the base of the heart be kept intact we get pulsations, and this under all sorts of circumstances, in the living animal, in the dead animal, in connection or out of connection with the other tissues including the vagus; while as soon as this part is destroyed the pulsation ceases, and if it is injured it ceases for a time and is then restored. Hence this part is called the "motor centre" of the ventricle, and on it the beating of the ventricle is supposed primarily to depend.

Certain rhythmical movements of the ribs, diaphragm, glottis, and nostrils together constitute the muscular action of breathing. If the nervous connection between any one of these muscles and the medulla be cut off, that portion of the respiratory movement ceases. If a point in the medulla between the calamus and the vasomotor centre be destroyed, the whole respiration ceases; while if the brain is removed above the medulla or the cord destroyed below it, such respiratory muscles as are still connected with it continue their functions. Hence any respiratory muscle performs its functions when connected with the medulla, although other circumstances vary very greatly, while if the connection or the medulla itself be destroyed the function ceases. Hence the portion of the medulla in question is known as the respiratory centre.

Wealth is greatly increased by the change from production on the small to production on a large scale, by the introduction of machinery and the division of labour. This holds equally if we compare a railway with a stage-coach, or a coach with a pack horse; a cotton mill with a spinning wheel, or a spinning wheel with a distaff and spindle. Under every form, at every stage and in every period, wealth has been increased by improved and extended co-operation between human beings. This complex co-operation of many-sided individual effort then appears as the mainspring of industrial progress. Where it is not we have stagnation—primitive barbarism, where it is found, in whatever form or degree, there by one means and another industry is improved and the material side of life made perfect.

(a) But here the old and well-known difficulty arises. There may be more than one cause of D. And thus B (for example) may be responsible for its appearance in the first instance, while E accounted for it in the second. It is true that the joint

method has a defence against this objection which could not be urged by the method of agreement. The content A must, if the negative instance has been properly chosen, be at least a condition of D. We do not get D without A, but this does not help us much. We have already urged that the method of difference by itself is enough to prove A to take part in the production of D; and the question which remained, and which the joint method undertook to settle, was what part A took, and, in particular, whether it was the total condition of D, so that the relation A — D would be universal. Now it is open to an objector to contend that while the concomitants BC, EF differ in *toto* , B and E are different contents, each of which will equally supply the factors which must be added to A in order that D may result. Thus not A alone, but A and B in the one case, A and E in the other, will be the true antecedent of D. And thus it may be said we can never prove A (or anything else) to be the true totality of conditions which being given D must result.

Admitting the plurality of causes, there are two possible answers to this objection.

(1.) To put the case for the joint method at its lowest we have—

AB	AE	AG	
D	D	D	etc.,

and it is suggested that in each case the factor A lights on a concomitant which completes it as an antecedent of D; B, E and G being equally good for this purpose. Now this at once involves that the different factors which are such as will combine with A in the way required must be very numerous relatively to those which will not do so. For supposing the two sorts of concomitants equally numerous,—supposing the contents which act as the required complementary conditions of D equally numerous with contents which do not so act,—then the chances of a conjunction of A with any one concomitant of either sort will be $\frac{1}{2}$, and those of a repetition of such a coincidence $\frac{1}{4}$, of *n* such coincidences $\frac{1}{2^n}$, which when *n* is moderately large will be indefinitely small. It results that A will be followed by D either in all or in the great majority of surroundings of any kind. This second alternative cannot be wholly excluded. If the coincidence is repeated 999 times, there might still be one case in the thousand in which it would not take place. Or to put the matter more strictly from the standpoint of probable reasoning, if a result fails once in a thousand times, we may very well experiment a hundred times without encountering such failure.

Thus a number of instances which would give an overwhelming probability against the equal frequency of concomitants which do and those which do not act as conditions gives no argument at all against the possibility that while the great majority of facts would fall into the first class some few might be found in the second. In a word, on these lines the joint method proves that A is *normally* the cause of D; it does not prove that it is so universally. It proves that if A as such does not cause D, the two facts are so related that most of the natural events in which A appears will supply the gap left in the totality of D's conditions, while those which refuse to do so are unusual and abnormal. We often, though sometimes too loosely, put this result by saying that A produces D unless counteracted, thinking of A as a positive agent tending to produce D, and of certain abnormal circumstances as defeating A. We shall see that the phrase "counteracting causes" admits of a stricter application. But an ordinary usage, which we may retain for the moment as convenient, seems to speak of a "counteraction" whenever a normal sequence fails to occur. And such normal sequences may be taken as established by the joint method, putting its argument at the lowest.

(ii.) But we may go a step further. Return for a moment to the method of difference and see how our difficulties arose. We had A producing D in the context BC, and the suggestion was that BC itself might contribute something to this result. Now if we compare this admission with a position previously taken up, certain points will arise which will be worth our consideration. We urged in Chap. VIII. that if A modifies the result of BC, that modification must be due to A as such; and from this it might appear that our admission in the case of the method of difference was not justified. For D is a modification introduced into BC by A, and it should therefore be due to A as such. Now this would actually follow if we knew exactly what was the modification introduced by A alone. But to determine this we should have first settled what is due to BC as such. And wherever this has actually been done by previous experience we have no difficulty in reading off the changes introduced by A as effects of A alone. But at the beginning of experience we do not really know the effects of BC as such. We have to determine them *pari passu* with the determination of A, and the solutions are inter-related. For suppose I have the simplest case possible, as

ABC	BC
DBC	BC

I cannot strictly say that BC as such persists unchanged, and

that therefore the alteration in it, D, is wholly due to A. For in strictness I do not in the negative instance get BC pure any more than I get A pure. A itself must in fact take the place of some X which may be conceived as acting along with BC. To give a simple instance. The pressure (A) which I apply by my hand to a lever (BC) takes the place of the atmosphere (X), or whatever other surface may have been in contact with the lever. And so in any other instance. We cannot, in short, *start* with the assumption that we know the effect of the concomitants as such. This would be to start with half our work done. The negative instance does not give us the true universal consequent of the concomitants, but of the consequent *under the circumstances of the negative instance*, i.e. in the absence of the agent under investigation.

On the other hand, the behaviour of a fact, as B or C, under any unknown circumstance can be judged only from its behaviour under known circumstances. The new context of course will always make a difference, but when it is a question of a difference in a determinate direction, the supposition that that difference will follow must be grounded on something in the nature of the new context. Thus from the negative instance taken alone we have no ground to suppose that BC would in any context tend to the production of D. And then when we find D as the consequent of A BC we should be led to attribute it to A as such. But here, in the method of difference proper, an obstacle arises. For it may fairly be said that the very fact that in the positive instance D does appear is evidence for connecting it in part with BC as well as with A. It is true that BC cannot produce D without A, but the sequence A BC - D is itself ground for supposing that BC contributes something to D quite as much as for the rival suggestion that D follows A as such.

It is precisely this suggestion which is negated by the joint method. To make this plain, suppose first that in any given case we knew the true effects of the concomitants BC, EF, and let them be $\beta\gamma, \epsilon\zeta$. Now, whatever be the effect of A, these two concomitants could not combine with it to produce a similar result. For the effect of A as such would be alike in both cases. Call it δ . Then we should have two wholes, $\beta\gamma\delta, \epsilon\zeta\delta$, in which like elements were combined with unlike, and as a matter of construction the wholes must be unlike. The utmost possible would be that the two wholes should agree in some feature; but this, apart from the common δ , must be purely casual. The total consequent, so far as it resulted, not from A alone, but from A acting with BC, EF, must be different

in each case. Whence, conversely, so far as it is in each case alike it must be attributed to A as such, and not to the interaction of B C and E F.

This argument supposes the action of B C and E F definitely known, and that we have seen to go too far. But if, in the negative instances, we find B C and E F behaving in quite different fashion (whether persisting unchanged as B C and E F, or issuing in different combinations $\beta \gamma, \epsilon \zeta$), then, so far as our evidence goes, we have every reason to take their effects in the new context A as still different. The counter suggestion, that just in the context A they might in some respect work out a similar result, is thus ungrounded. It is an unmotivated possibility. If it rests on anything, it must be some concrete feature in the character of the facts concerned, against which those who applied the method in such a case would of course take their precautions. Apart from this, it may be dismissed as ungrounded. And that their total effect should be similar is impossible. From this point of view, then, our method seems capable of establishing a true universal relation to the full degree of unchallenged certainty which we require.

To illustrate. The D line appears in the sodium spectrum whether the sodium be pure or an ingredient in another substance. Yet the different substances in which sodium might be present, so far as they contribute to the spectra, give each of them, so far as our evidence goes, different bands. If we supposed any two of them to co-operate with the sodium in forming any portion of the spectrum, the two spectra so formed should, in respect of that portion, be different; but in fact the yellow line is constant. Similarly, take any law you please, holding true of energy in different manifestations, of substance in different forms, or of life under different circumstances; to attribute the common result whether wholly or in part to the *difference* in the manifestations, forms, or circumstances, is obviously the height of unmotivated absurdity. If the law of multiple proportions holds for all substances examined, that is obviously not due to the special character of those substances, for *qua* special each substance has its own peculiar (*i.e.* *different*) effects. If the rate of expansion is equal for all gases, this cannot be due here to the lightness of hydrogen and there to the density of carbonic acid gas. If the mercury rises when the pressure increases, this could not be due to a simultaneous rise and again to a fall in temperature, for the effects of heat and cold are not alike.

It will be perhaps better to turn from these instances where the suggestion of failure in the method is really unmotivated

and fantastic to a case when the alternative has or has had more actual interest. To determine the rate at which an excitation is propagated along a nerve we make a double experiment. In the first we stimulate a nerve close to a muscle. In the second we stimulate the same nerve at a remoter point, and find that the muscle contracts later. Here A (the suggested cause or ground) is the extra length of nerve which the excitation must traverse, and D (the effect or consequent) is the difference of time. Now, if the first experiment be made close to the muscle, it may be suggested that the stimulation involved diminishes the excitability of the nerve, and that this concomitant fact (B) accounts for the whole or part of the difference in time. Or equally if the order were different, i.e. if the stimulus had been first applied to the remoter point, it might be suggested that the stimulation increased the excitability, and that this concomitant (C) accounted for the diminished time. But when, varying the order of the experiments, we find the result constant in both cases, we dismiss both of these suggestions at once.

The narcotic effects (D) of opium are familiar. Now, opium contains morphine (A) along with other substances, sometimes codeine (B), sometimes other alkaloids (C). Neither codeine nor the other alkaloids could be shown to produce narcosis in isolation; while, conversely, morphine, whether combined with codeine (A B) or with other alkaloids in which there was no evidence at all for the presence of codeine (A C), had a narcotic effect (D). Hence it was reasonable to conclude that morphine is the operative element in opium, an inference which is corroborated by experiment with morphine in isolation.

Our result is, that if we find no common element in the various sets of concomitants we can argue with great probability to the universality of the relation $A \sim D$.

(b) Now taking our two sets of antecedents, A B C T, A E F T, and neglecting T as not now in question, we have to ask, first, whether B C, E F can be the whole of the concomitants, and secondly, whether they have no identical point. As to the first point, we may say that any unobservable fact U must depend either on T, in which case it ranks along with T among the permanent elements of nature; or it is a concomitant repeated with A, and must be somehow connected with it. Its case is then parallel to that of the unobserved concomitant in the method of difference, and may be treated in the same way. The second question remains whether B C, E F contain any point of identity. The difficulty of this question is best felt when we think of the case of "counteracting causes." A force

P produces motion M V, as is shown by the fact that motion follows under circumstances which have "nothing" in common except that force. But another case presents itself in which P produces no motion at all, because it is "prevented by a counteracting force" Q. The set of circumstances in which P appeared had, it would seem, this much in common, that Q was absent. They agreed, as Mill would put it, in certain negative conditions—they agreed in differing from a further case, now apparent, in which Q appears. Now this result may be unobjectionable in point of pure theory. Its difference from another antecedent is in a sense a characteristic of this antecedent; the absence of certain features from a totality characterises that totality. The significant negation expresses a difference or rests on a difference, as we have seen. Hence if we call Z the ground of difference from any cases containing "counteracting causes," i.e. conditions leading as such to contents other than D, we must admit that if A is the sole ground of D, A must contain Z; and conversely, if BC and EF have any Z in common, the security of the generalisation A - D is impugned. But an analysis so accurate as to detect such elements of identity may be a theoretical ideal, but must come rather at the end of science than in the early stage occupied by the inductive process. We must then have a different method of dealing with counteracting causes. Applying our principle of causation, we know that A - D will be universal unless the change of D to Δ has an universal antecedent in some change accompanying A. But now a change, we may put it, must consist in one or both of two points. Instead of the concomitant B we have E. This means (a) that B which was present is now absent, and (b) that E which was absent is now present. Now we may go on, if a content E is such as to be always followed by some Δ which excludes D, i.e. is such as to "negate" D, then the mere fact of E's absence may be regarded as a condition of D. But if not, not.¹ Unless, that is to say, E negates D, the mere absence of E or the mere presence of such general and abstract characteristics of the surroundings as are involved in the absence of E cannot be a condition of D. Now between two cases AB - D, AC - D let there be what appears to analysis a total difference. Analysis may say to itself, "I still cannot be sure that there is not this much in common, that both these contents are exclusive of some fact E which

¹ For we may put it, either E as such is ground for negating D or it is not. If it is, then its absence as such must be one condition of D. If not, its presence is not a final reason for negating D, nor therefore can its absence as such be postulated by the assertion of D.

might be a concomitant in another case. But granting that this is so, it will not affect the result before me unless E is such as to be always followed by the absence of D." E must be what we call a counteracting cause. Now, of the existence of E we shall require evidence: first, evidence that E exists at all; secondly, evidence that it is found in any given case in which we are interested. And we can apply our generalisation with a probability inversely as the probability of E.¹

We have arrived here at a more definite meaning for the term "counteracting cause" than we were able to affix to it in the earlier stages of the discussion. A total cause, we may say, is that from which a consequent follows universally. A positive cause is that from which it follows in the presence of concomitants which do not of themselves produce it or any element of it. A counteracting cause is that from which some second effect follows, of a character related but opposite to that of the first. Thus when a positive cause is totally counteracted, the total consequent, being such as to correspond to an ideal construction of the two effects, presents no apparent element of the first effect; if counteraction be partial, some elements only of the first effect will appear.

Now, with some reservation, we admitted the term "counteracting cause" as applicable to any abnormal concomitant in which a familiar result fails. We cannot, it would seem, deduce from the theory of causation, but we may perhaps infer from general experience that in their application these two usages would coincide. A relation holds in a great variety of circumstances, but with certain concomitants it fails. Now, there are two ways of explaining this. Either all the circumstances of the first set are favourable to the result, or those of the second set counteract it. The second hypothesis can be tested by considering the effect of those circumstances apart from the antecedent under trial, and if they give effects of "contrary" quality they are counteracting causes. We may suggest that common sense—which means the result of thought acting on masses of experience too great to be perfectly articulated—takes the second hypothesis as more probable in proportion to the extent and variety of the circumstances in which the

¹ It may be said that E, the strict universal antecedent of a change, is as difficult to discover as A itself. That is true of the precise definition of E. But the denial of our inference only requires some degree of evidence for the existence of E. This would be obtained definitely by a negative instance of A without D in the presence of some E, or by analogy from cognate cases. In fact, we could discover E to be a partial or "positive" cause, just as we can discover A to be. Which, then, is a true "total" cause can only be determined by discovering the case A E.

relation holds. That is to say, analysis constantly resolves the "exceptional circumstance" into a counteracting cause in the strict sense. And so the two conceptions tend to coincide, and the relation which holds normally is taken to hold always, unless counteracted in the sense in which we understand those words, and our first account of the logic of the method tends to the same point as our present more detailed analysis.¹

It is not necessary to illustrate the conception of "positive" and "counteracting" causes at any length. The simplest and most obvious illustration is the one taken above of mechanical forces. We might also refer, in physiology, to a reflex which is subject to inhibition, or in political economy to the tendency of increased demand to augment price, unless met by an equiva-

¹ Mr. Bradley (*Logic*, ii. 2, par. 3) argues from the fact of plurality of causes that "the generalisation" resulting from the method of agreement "is vicious, and the canon which regulates it is false." As to the canon, it is a case where a principle is true on a certain condition or with a certain limitation. To hold Mill up as a horrible example of intellectual obliquity, because for the convenience of exposition he states the canon without that limitation in one chapter, while he carefully explains it in the next but one, seems an excess of zeal. As to the generalisation, Mr. Bradley gives only one side of the case when he says crudely that it is "vicious." Mill himself saw that it was vicious if regarded as a conclusion fully demonstrated by a single set of instances, but he explains it (and rightly from his data) as a probable argument, the probability being as the number of the instances. *Logic*, iii. 10, 2.

Mr. Bradley is equally unhappy in his criticism of Mill's instances. "Let us take once again the very first instance. The universal which you come to is, 'that the combination of an oil and an alkali causes the production of soap.' The universals which you start with are that an oil and alkali, if combined under certain conditions be and do, in each case produce soap. But how can you deny that these latter are universals?" We do not deny that the premises are in this case universals, but they are relatively narrow and concrete universals, while the result is wider and more abstract. That is, the method obtains a more general from less general truths. Mr. Bradley's statement obscures this, for he puts the premiss in such a form that the work of the method appears already done. The true premiss is, "This pair of substances a b, and this c d and this e f, all in combination produce soap." Then comes the work of the method, which is to analyse and compare them so as to find that they agree only in a β, the fact that in each case the pair are an oil and an alkali. Then we have the wider universal "oil and alkali as such give soap," which is our conclusion. The method here starts from true universal relations, and goes to a higher universal. But at a lower stage it starts from a true particular. Mr. Bradley thinks this cannot be, since, as soon as you have reduced the particular to a "perfectly definite set of elements, existing in relations which are accurately known, you have a judgment as universal as the result of your induction." But this is a confusion between the general content and the universal relation. If I know precisely that I have here A in the context BC followed by D, I have a definite content before me consisting of so many clear elements, each of which may be called a general attribute or form the content of a general idea, that is, which may occur anywhere else. I have not yet any universal relation, i.e. I cannot yet say that D will occur when A recurs: and I cannot say this without that comparison of instances which induction requires.

Jevons *Principles*, vol. II. chap. xix p. 231 argues against the possibility of proof by experiment that "we must not assume an independence to exist among

lent increase of supply. It will not be amiss to dwell on the last illustration for a moment. For when demand has been shown to be a merely positive cause of price, and the conception of the equation between demand and supply has been brought in to supplement it, we might be tempted to think that we had the true total ground of price. Really, there are still further counteracting causes, such as custom, prejudice, stupidity, or good feeling, all of which may or might on great scale or small influence prices.¹ These, then, must either be set down as counteracting causes or taken up into the previous formula by some such device as that of limiting demand to effective demand, and so on.

(c) We may notice here a special case of some interest. We

the conditions." Discussing the proof that heat is produced by friction, as grounded on the experiment of rubbing two sticks together, he mentions the various "conditions" capable of being eliminated, e.g. conduction by Davy's experiment, and proceeds "Previous to experiment we have no right to say that the rubbing of two sticks will produce heat in the same way when air is absent as before. We may have heat produced in one way when air is present, and in another when air is absent. The inquiry branches out into two lines, and we ought to try in both cases whether cutting off a supply of heat by conduction prevents its evolution by friction." As the result of this assumption he is easily able to show that the business of elimination is in the simplest case infinite.

Now, this reasoning rests on the plurality of causes. We have A (friction) B (conduction) C (presence of air) d (heat). And we have

ABC	AEF
d	d

(where E is absence of hotter = presence of as cold or colder surroundings, and F a vacuum). It is suggested in effect that while B and C together produce d (or are contributory conditions along with A to producing d) in the first instance, E and F perform the same function in the second. That is in reality, that BC and EF are two fundamentally different causes of d.

Jevons, in fact, makes the assumption combated in the text, that conditions of which all we know is that they are different, and these effects different, will here out of pure malice give an identical result and so thwart our induction. Unmotivated scepticism will not easily do this. In fact, we aim at varying a single condition by itself (e.g. temperature in a physiological experiment) only when there is special reason to suppose that that condition interferes with our result. Otherwise we vary not as little but as much as we can, the strong presumption being that whatever varies without affecting the result is irrelevant.

Sigwart's criticism (§ 85, pp. 419, 420) could only be relevant if the method of agreement set itself up as a guide to discovery. When he says that the only result of the method as applied to the causes of death is that "that which is to die must previously have lived," this may be true in the existing state of our knowledge. But this may only mean that we do not yet know the final analysis of any of the modes of dying. The common point in death and its antecedents is still to seek. Assuredly no one ever supposed that the method of agreement was an open sesame "to the secrets of nature so potent that by crudely applying it to any mass of raw fact you would at once get any causal relations you might require."

I am not, of course, thinking of the remoter causes (such as cost of production) which influence demand and supply themselves.

have already seen that a persistent identity is as such a basis for a certain hypothetical inference. If the fact A persists for any time, it will do so always, unless it meets with a concomitant C having a change in A as its necessary consequent. Now, if experience suggests certain changes C, D, E which may have such a result, the inference to A in any case is doubtful. But if we test A in all these circumstances and find it unchanged,—if every analogy which experience suggests for a change in A is thus taken account of,—the suggestion that A will change is reduced to an unmotivated possibility. Similarly, if only C can be found to change A, the suggestion that A will change under any other circumstance is unmotivated. Thus the weight of a substance is permanent for the sum of its parts, since no known change of chemical form affects it. This inference rests on an exhaustive negation—exhaustive, that is, of all possibilities which any analogy can suggest, and hence is used in chemistry (as noted above) almost as an axiom. And probably all the great masses of induction establishing *permanence* could be reduced to this type.

So far we have treated the joint method as essentially a combination of the methods of difference and agreement, the former proving the antecedent to be a factor in producing the effect, the latter showing that no other conditions are required. We now see that the former function may be supplied by the argument from continuity. If we have A - d a continuous process, or still better A - A a persistent identity, this indicates at once with high probability that the antecedent is at least a factor in the production of the consequent, and hence the only question remaining is whether there are any other factors; so that for relations of this kind we do not practically need to go beyond the method of agreement. A great mass of our common knowledge seems to rest on these considerations. The substances or "objects" of everyday life form connected wholes for us (are thought of as substances), because maintaining their character through changed surroundings, and so far as these changes are exhaustive we have warrant for thinking of them as "really" substantial. So also with the ordinary processes,—motions, qualitative changes, and so on,—we think of them as self-determining or conditional, according as they stand or fall before the test of the method of agreement. By the "joint method," then, must be understood a combination of "agreement" with either "difference" or "continuity," as the case may be.

(d) Generalisations to the effect that one event is always followed by another, except in the presence of one which is always (or always unless in its turn counteracted) followed by a

change in that other, are the normal generalisations of science. They can be applied to any case with a probability proportionate to the weakness of the reasons for supposing a counteracting cause in that case. We shall show in the next chapter that such partial knowledge of causes as is supplied by the method of difference and the joint method tends to multiply itself, and the same processes that give us knowledge of what we may call positive causes make counteracting causes known to us too. And with such knowledge we can apply generalisations derived from the joint method with considerable certainty.

In point of fact, the results of the methods are probably taken as certain, and used with success at an earlier stage than our theoretical analysis would suggest. In the actual usage of science it is, I take it, only so far as there is some definite ground for suggesting an alternative that either the method of difference or the joint method is doubted. So far as there is reason to suspect some unobserved concomitant, so far as there is ground for supposing some coincidence with a cause of a different kind, the respective results of the methods are called in question, and when these grounded doubts are removed they are treated as certain. The abstract considerations which we have gone through represent in fact only certain bare analogies from experience, which can be urged against their ideal certainty. They are the last remnants of the counter suggestions of experience, and at the point when they are overcome—i.e. where the failure of our result would involve a combination without parallel or analogy in our experience—we come to proof proper.

We may notice at this point that every complete induction which is to prove causation really fails in the last analysis under the joint method.¹ For every observed relation would be an immediate basis for an universal judgment if it was not for the possible influence of the concomitants. Hence all scientific induction must aim at eliminating this possibility. And there are two obvious methods of elimination. The first is by getting a single point of change or difference in the antecedents, and seeing what follows. This is open to the objections that there may be an unobserved change, and that the unchanging concomitants may combine with the point of change to produce the effect. The second is by finding differences in the concomitants, and this is open to the objection that they cannot all be changed, and that different causes may produce the same effect. The combination of the methods removes

¹ Concomitant variations is scarcely an exception, for it rests on variation and requires attention to the concomitants.

both sets of objections. It destroys the possibility of indirect causation by showing that the permanent conditions do not suffice for the effect, while it puts aside the influence of the observed concomitants by varying them, and of the unobserved by the unlikelihood of a repeated coincidence in divergent surroundings. Lastly, it may be noticed that the method required is really that of agreement and difference in the sense that a simple combination of a negative instance with agreement is insufficient. If I have A in many contexts with D, and without A no D, I must still know that A is the only point of change, and not part of a whole A C. For in this case C might be the true factor, and though by a secondary application of the method of agreement itself to the points of change A C, A E, I can eliminate C and E and reduce the common factor to A, yet this postulates that originally A C and A E respectively are observed as the sole point of change. I conclude that the exhaustive observation of the changes which are, and of the changes which are not, followed by a difference in the result is the basis of scientific induction, which consists essentially in a combination of these observations. On particular occasions we may speak of employing the method of difference or of agreement, but that is because the work of the other side of this logically inseparable whole is tacitly presupposed. A may be already well known as a factor in B, and all that is required is to know whether or how nearly it is the total cause of B. Or the cause of B may be known to be within the whole A X, and it is only necessary to see what in this whole can be eliminated. But in both cases we assume knowledge derived from the reverse side of the method which we are now pursuing.

The certainty of the joint method, i.e. of any complete induction, is of course absolute, granting it its hypothesis, namely, that all the relevant facts have been taken into account. When we push the question further, and ask how we can ever be sure that observation and analysis have gone far enough and taken enough facts into account, we can only deal fairly with the method by asking, as before, what ground there is for doubt? So viewed, the answer takes a fairly simple form. Wherever we can find a case of failure we may argue that failure is at least a possibility in a parallel case. A range of instances that has once proved too narrow may prove too narrow again. A method of "eliminating" casual concomitants that has failed here may also fail there. Conversely, if a method, or application of a method, has never been known to fail, there is no rational ground for disputing its validity in

any instance. If, for example, we can take the joint method as applied with certain precautions over a certain width of instances, and can find no instance of its failure so applied, we have no ground for doubting its results. Now to discover and make use of such application is the business of each special inductive science, not of logic in general. As the required tests in any subject matter become known, the knowledge of that matter assumes a stable form and becomes a science. Different investigations no longer lead to conflicting results, but corroborate and supplement one another. Wherever, then, a stable inductive science has been formed, there the appropriate use of induction has been, for that body of matter, found out and applied, and the inductions of such a science can no longer be matter of legitimate doubt.

Briefly to sum up our theory of the inductive methods. Starting from any single case of a relation $A-B$, we saw that the attempt to generalise it would be met by a counter consideration. This would rest on the fact that any relation will have manifold concomitants, and that changes in these constantly modify observed conjunctions. To meet this consideration we tried first an increase in the numbers of conjunctions observed. We found that on the theory of chances this proved some connection, close in proportion to the number of conjunctions observed, and we found that generalising such a conjunction, and testing the generalisation by wider experience in parallel cases, our deduction from the theory of chances was borne out, and we got a higher probability as the numbers taken increased. But still in this method we laboured under the initial difficulty. There must always, according to our experience, be concomitants, and nothing could be said, on the ground of any rule of probability, against the repetition of the same concomitants many times over. Our arguments therefore at best proved only *some* connection without specifying what. It remained to eliminate concomitants altogether by observing, first, their absence. This could be applied only to the facts of change, and even then it was necessary to show that there was no ground for supposing an unobserved concomitant before we could conclude to a direct connection. Moreover, we could not in this way arrive at knowledge of the whole conditions of a sequence. And thus, secondly, we appealed to a complete variation of concomitants. The concomitants thus eliminated, and there being no reason to suppose a further unobserved factor, we could conclude ideally to a total cause, more readily to the total positive cause from which the effect could be inferred in the absence of counter-

acting causes. Important subsidiary arguments were derived from continuity and concomitant quantitative variation. The development of science from this basis, its growth in certainty, insight, and completeness will be the subject of our next chapter.¹

¹ The above discussion of the Joint Method is based on Dr. Venn's amendment of Mill's account (*Empirical Logic*, p. 430).

CHAPTER XVI

THE INTERCONNECTION OF GENERAL TRUTHS

So far the generalisations we have accounted for have been isolated, or as they are sometimes not very happily called, empirical, laws. This would matter less if their certainty could be regarded as complete, though even in that case we might have to ask how we were to apply them to the complexities of nature. But they are not as they stand absolutely certain; in many cases the degree of uncertainty attaching to them is practically appreciable, and in all cases it is of theoretic interest. We have therefore to inquire whether, by connecting these isolated generalisations with one another, we can wholly or in part eliminate this element of doubt? Suppose we have a generalisation $\alpha - b$ grounded on an induction strong enough to make it probable but not strong enough to make it certain. Suppose, further, that we can connect this induction with another $\alpha - \beta$ which is also probable. Suppose, first, the connection to be such that if $\alpha - \beta$ is true $\alpha - b$ must also be true, and assume that the evidence for $\alpha - \beta$ is entirely independent of that from which we inferred $\alpha - b$. It is clear that the probability of $\alpha - b$ is increased. A fresh and independent consideration is adduced in its favour. The nature of the increase is best seen by putting it arithmetically. Let both the generalisations have an independent probability of $\frac{1}{2}$. Then the probability that α is not b is $\frac{1}{2}$ before we investigate it on its own merits. The result of our investigation is independently to reduce the probability to $\frac{1}{4}$. The actual resultant probability that α is not b is therefore $\frac{1}{2} \times \frac{1}{2}$, i.e. the probability of $\alpha - b$ is $1 - (\frac{1}{2} \times \frac{1}{2}) = \frac{3}{4}$.

But there is a further possibility. The inductions $\alpha - \beta$ and $\alpha - b$ may be so related that they imply one another, i.e. that not only does $\alpha - b$ follow from $\alpha - \beta$, but if $\alpha - b$ is true it follows also that $\alpha - \beta$ is true. In this case it appears that the probability of both generalisations is increased.¹ The fact that they

¹ If we wish to put the increase mathematically we must in this case use a different formula. For not only does the probable truth of each generalisation

coincide is fresh evidence for both of them. In the world of knowledge, as elsewhere, union is strength. Two judgments relatively weak in isolation gain strength when seen to corroborate one another. Each has its own ground and each is ground for the other, and therefore increases the considerations making for the other. It is clear that this relation need not be limited to two judgments. A third and a fourth may join the band and add to its strength. And, lastly, each judgment may be connected in one relation with this, in another with that, independent belief, so that ultimately our thought might form a single system in which all parts should be interconnected. It will be our business in the present chapter to explain the various ways in which inductive results can be thus interconnected.

1. *Variation of the cause.*

(a) General principle.

The first method of connecting inductions may be put in general terms as follows:—By the inductive methods I can get a high degree of probability for the generalisation $a \rightarrow b$. Similarly, I have a highly probable generalisation $c \rightarrow d$. Suppose now I have a fact qualified by both a and c , I shall expect a consequent qualified by both b and d . Of course, a and c may be related in very different ways. They may stand, as we sometimes put it, "side by side," so that the whole formed is more appropriately symbolised as $a + c$. Two forces applied at different points but tending to move a body in the same direction, e.g. two weights in one scale might serve as an instance. Or a or c may be a whole in which c , a determinate difference, *qualifies* a . And here either c or a may be abstractions, facts not capable of presentation independently of some qualification, whether that which they exhibit in this instance or in some other. Thus a might be a volume of water at a given temperature and c a definite change of temperature; a

support the other, but in this case the probable falsity of either would be an argument against the other. We may perhaps compute the probability after this fashion. Let $a \rightarrow b$ and $a \rightarrow c$ have each a probability of $\frac{3}{4}$. This means that inductions of such a kind are correct three times out of four, and incorrect once in four times. That of two such inductions both will be true has then in general a probability of $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$, and that both will be false a probability of $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$. But by our hypothesis one or other of these alternatives must hold, i.e. the remaining cases in which one might be true and one false are put out of court. Hence of the only possible alternatives, one is more probable than the other in ratio of 9 to 1, i.e. the combined inductions have a probability of $\frac{9}{10}$.

I am much indebted to my friend, Mr. A. E. Jolliffe, for valuable criticisms and suggestions on the application of the mathematics of probability to this point. I should say here that I conceive such an application to be of use merely for purposes of illustration. It is not, I think, the real basis of the argument before us, but it illustrates the rate at which probability increases.

might be a "typical" cell (of course an abstraction) and *c* the particular development (elongation, etc.) constituting *a* the cell of a longitudinal striped muscle. But in any of these cases we may have evidence of the behaviour of both *a* and *c* from the joint method. As long as we have this evidence the relation between *a* and *c* is immaterial. It does not *prima facie* matter whether *c* qualifies *a* or is a part of *a* or *vice versa*. All we are concerned with is that we have *a*, and that accordingly, if our previous generalisations were good, we must expect *b* to follow. It may be objected that the presence of *c* may "affect" the action of *a* or *vice versa*, but the point is that if the inductive tests have been properly applied we already know the way in which *c* will affect *a*, namely, by introducing the modification *d*. Hence if both consequents *b* and *d* be known, and if we are capable of making the construction, we can infer the result *b* *d*. And so far as *b* and *d* are *probable*, so far *b* *d*, the whole, is *probable*. Of course, the new case may be just one which will throw some quite new light on the consequents of *a* and *c*. It may be the exception which redetermines the rule. But if the joint method has already been applied with due stringency, we have strong probability that *b* and *d* are the true consequents in any case. We have ground for believing that they will not fail at all; and that they will fail just in this case will be still more improbable. Hence we get a very strong antecedent probability for the effect *b* *d*.¹

Thus *a* and *c* may be two mechanical forces operating on the same body, the resultant (*r*) of which can be determined

¹ This is of course subject to the limitations laid down in explaining the joint method. If there is any evidence that the new concomitants are counter-acting causes the inference still holds, but in a special shape, for in the total *b* *d*, *b* and *d* will tend to reduce one another to zero. One misunderstanding must, however, be guarded against. The effect of *a* may be to modify *c*, and that of *c* to modify *a*. If we thoroughly understood the nature of *a* and *c* as "positive" causes we should expect this beforehand. But the new whole *b* *d* *a* *c* may have further consequences or enter into interactions with other agents in a manner quite incalculable from the behaviour of *b* and *d* taken singly. This is the case (*inter alia*) of chemical combinations. Of course, the fact that carbon and oxygen form carbonic acid depends on the character of oxygen and carbon (together, in strictness, with the conditions under which they are brought together), and would be inferable therefrom if we had enough knowledge of those elements. It is only the further behaviour of this new whole—its reactions with other substances or its behaviour in varying conditions—which we can in but a slight degree determine or explain from our knowledge of the components. And this whole, we must remember, does not consist of the free oxygen and pure carbon whose properties we have determined, but of oxygen and carbon in some modified form. Strictly taken, then, composition of causes holds universally, and thus so far as we know the character of a cause we may apply our knowledge when the cause is acting in any fresh combination.

by combining the effects b and d of each. Or a may be a freezing mixture which cools (b) a body immersed in it, and c the liberation of a gas from pressure which also lowers the temperature (d). The liberation of a gas already cooled by a freezing mixture (a c) will reduce the temperature doubly (b d). Cells in general exhibit some contractility on stimulus. Imagine a contraction taking a determinate direction lengthwise down an elongated cell and you have the rudimentary form of muscular contraction exhibited as a simple modification of ordinary cellular processes.

An important result follows affecting the whole problem of induction. By separate inductions I have a probability (say of $\frac{1}{2}$) for the generalisations a b and c d. The probability, then, that both these generalisations will hold true is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ approximately $\frac{1}{3}$. Then $\frac{1}{3}$ measures the *antecedent probability* of the sequence a c-b d. But now suppose that I examine this combination in the concrete, that I test it in turn by the inductive methods and get the same probability ($\frac{1}{2}$) of its truth. This probability will be *independent* of the other, being arrived at by independent observation. Hence the total probability of a c-b d will be as the joint probabilities which here converge upon the proof of it. Mathematically it will be as $\frac{1}{3} \times \frac{1}{2} : \frac{1}{3} \times \frac{1}{2}$, i.e. as 36 to 1, a very much higher certainty than before. That is the combination of two probable generalisations, and the subsequent verification by an independent induction of their joint result very greatly increases our certainty of that result as compared with the certainty we could obtain by either calculation or induction separately. Nor is this all. a c-b d has an independent probability of $\frac{1}{2}$, and c-d has a probability of $\frac{1}{2}$. But if a c-b d and c-d are both true, a-b must be true also. For if the whole a c causes the whole b d, and of these the part c causes d, it remains that a causes b. Hence the argument applied to a c-b d may be in turn applied to a-b. It will have a probability of $\frac{1}{3}$ in addition to the probability of $\frac{1}{2}$ derived from its own induction. And so with c-d. Hence the combination of the three generalisations materially raises the probability of each and all.¹

(b) Application to quantity.

If now we put c=a, we have the case of quantitative variation aa or 2a. Thus a is a force communicating a certain momentum to a body, 2a produces twice that momentum. Or

¹ Of course we cannot apply the whole increase of probability to each of the three in turn, or we should have a self-multiplying process. But each generalisation, if not already certain, must be in its due degree rendered somewhat more probable by coinciding with others.

a is a change in the direction of a force which alters the direction of the moving body. Move the force through the angle $2a$ and you alter the direction of movement in the same degree.

But here arises the question left over by an earlier discussion. Quantitative variation does not always take place by simple laws. It is pleasant to get warm, but it is not twice as pleasant to get twice as warm. To put the same objection on grounds of theory, it may be urged that here the inference from the method of agreement breaks down. I have tried the effects of a in the context p, q, r, s , etc. But I have not tried it in the context a . All the other contexts have the common point of differing qualitatively from the agent a itself. Accordingly, I cannot infer *a priori* to the conduct of a when combined with another a to form the quantity $2a$.¹

In point of fact, what we call "causes" and "effects" do not always vary in constant proportions. Nearly all physical stimuli, as their intensity varies, pass rapidly from the pleasurable to the utterly intolerable stage. Nor can we, in face of countless familiar phenomena of "periodicity," lay it down that the variation will be always in one direction. The upper C resembles the lower more nearly than any intervening tone, though the vibrations increase regularly in frequency. The outermost violet of the spectrum is to the eye nearer red than is green, though again the wave-lengths continue to diminish from red through green to violet.² Size of brain is almost undoubtedly connected with degree of intelligence, but a frog

¹ A special caution is required here. We saw above that if the general qualities A and B including all their degrees $a - b$ to $n a - n b$ were connected in such in the strictest sense, their variations ought to follow a law of simple proportion. But here we are starting not from $A = B$, but from $a = b$. The latter connection is taken to be substantiated in the sense that a is the total positive cause of b . Now if this is true, and if the *whole* of a varies, I imagine that the law of simple proportion must hold, and we can convert the connection and say, If $a = b$, $A = B$, and if $A = B$ then $a = b$. In fact, we make this inference in the laws of energy and of the permanence of substance. But if the total cause contains an element which does not vary (e.g. if $a = a_0$, and if a higher degree of a means really an increase of a while a_0 is stationary, there is nothing in the connection $a = b$ to indicate the quantitative result of $2a$ or $n a$. And this corresponds to the ordinary causation which we speak of varying the cause. For what we call "the cause" is in fact as a rule a part of the true ground "acting on" another part, e.g. stimulation of nerve. Increasing the stimulus, the nerve remains constant or if altered, e.g. in excitability, is not necessarily altered in the same direction as the stimulus, and the question then arises as to the result. Conceding then that our general principle gives us guidance in the very simplest cases, in all but these we require specific experience to help us.

² In the instances quoted, and no doubt in countless others, the periodicity can be "explained." In the simplest case the return of the effect at a higher stage to something like its character at a former stage is in direct parallelism

with a large head filled with brain substance is perhaps as stupid as a crayfish with its insignificant ganglia.

We cannot, except where our knowledge is exhaustive, say much *a priori* of causal variations of degree. But the method of agreement does not altogether fail us, for we can apply it to the varying degrees themselves. If we have

a	2a	3a
b	2b	3b

it is obvious that variation of quantity as such makes no difference to the sequence a b. We may accordingly (from a few variants) expect to find any a followed by b. But here two cautions are necessary. First, we must consider (in accordance with the ordinary canons of this method) whether there is any common point in the degrees selected for examination. If so the inference will not be safe to other degrees, especially to those which are widely divergent. Thus the degrees above instanced agree in being *low*. It is possible, then, that 12a or 20a, it is even possible that 4a, may have a different kind of effect. Nor is mere lowness (or height) of degree the only possible form of identity. Any "periodicity," such as the choice of the squares, should be avoided if the inference is to be sound. But if we take both low and high degrees, avoiding any special point of resemblance, a few instances give us high probability for all intervening cases. Inference beyond the extremes observed—what Jevons calls extrapolation—is always uncertain, and a broad experience has shown us that the highest degrees of a quality are very liable to be followed by qualitatively different effects. Confining ourselves to "moderate" degrees, a very wide range of instances would assure us of Boyle's law, and the generalisation seemed sound until examination of much greater pressures proved a deviation. Similarly, Weber's law holds for certain stimuli (e.g. sound) within tolerably broad limits and then entirely breaks down.

Notice, secondly, that it makes a great difference whether the inference you wish to draw is merely that any a will have some b as its effect, or that the degrees of a and b will in all variations observe the same proportion. The first inference is obviously much the safer, i.e. is substantiated by fewer instances. Thus if Boyle's law merely stated that volume

with a like return of the cause. The vibrations of the octave are just double those of the original note, and perhaps the same explanation may apply to colours (see Wundt, *Phy. Psych.* 11, caps. 12, § 4). There is the same sort of resemblance between the causes as between the effects. But that just this kind of resemblance would operate in just this way could surely be proved only by specific observation.

decreases as pressure increases without further assigning a direct proportion between the two facts, it would not be falsified by any known instances, though of course it would be less valuable.

I conclude that our real guide in estimating the effect of quantitative or qualitative variations is, apart from the simplest cases, nothing but the method of agreement applied to the examination of instances of those very variations. *A priori*, we may know nothing of the difference which any variation will produce. But when we have tested it we may apply our results to new combinations with a certainty proportionate to the thoroughness of our test. It follows that if one series of inductions goes to establish a connection between a and b with a certain law of concomitant variation, and if a second set of inductions go to show that ma gives nb ; then if the quantities in the two cases tally according to calculation with one another, these sets of inductions confirm one another, precisely as the inductions $a-b$, $c-d$, and $a-c-bd$ in the cases first taken. In the first case we combined inductions of different character; now we connect results differing only in quantity.

Such combinations clearly articulated or obscurely felt seem to form the backbone of our confidence both in scientific and in common-sense results. We have, in fact, here the converse case to the interference of counter considerations which has hitherto guided our account of induction. A belief rests on such and such considerations, and if these are the only evidence bearing on the subject, that belief must be provisionally accepted. But it may yet encounter other results drawn from equally good evidence. These may conflict with it and then we have to balance probabilities, or they may support it and then we have an added confidence. The business of induction is to eliminate the first contingency and provide for the second,—to put counter considerations out of court and to find considerations with given support. This second operation is as applicable to "unscientific" as to "scientific" inductions; the common-sense generalisation or the analytic comparisons of the experimental methods equally gain strength by union.

(c) But are the probabilities of connected inductions really independent? Suppose (it may be said) that the induction $a-b$ laboured under a doubt arising from the possibility of an unobserved concomitant X of a . Why should not that very same concomitant X be present here in the case $a-c$? Again, granting $a-b$ universal in certain contexts, the method of agreement converts the relation into a strict universal by

varying the contexts, *e.g.* by trying it in company with p, q, r, s . Suppose now that $a-c-bd$ has been tried in just those contexts, or in some of them, over again. Then the inductions will not be independent.

The objection has force, and we can deal with it only by careful consideration of the nature of the facts connected. The answer will best be understood by dealing with our two main cases separately.

(1) Quantitative variation.

If $a-c$ is qualitatively like a but much greater in quantity, it is clear that the conditions under which we observe its effects will differ in some important particulars. For example, operating under the method of difference, I perform the act p in order to produce a , and I find b following. Now p may have introduced q , which was too small for my powers of observation to detect. For example, a given chemical substance might owe certain of its reactions to the presence of a foreign substance too small to be observed. Or again, in stimulating nerve A I might slightly excite B as well. At the given degree of intensity this second stimulus might not manifest itself. Now, if I wish to try a higher degree of a , I must also either increase p or bring about a by other means. But increasing p will probably increase any other effect it may have as well as a . Hence if q really existed, and was unobservable on account of its minuteness, it should now become evident. If it does not, the probability that it is non-existent gathers strength. Thus increasing the quantity of the substance used I should also increase the foreign substance which might now exist in sufficient quantity to be manifest. Or in increasing the stimulus to nerve A , I should increase that of B , which would then give some palpable sign of itself.

Here, then, the two inductions are at least in part independent, and so far as this independence goes the probability both of $a-b$ and $a-c-bd$, and therefore of the general $A-B$, is increased.

But this is not all. Suppose the original induction an error. The relation $a-b$ was then really due to the presence, say, of m . This supposition has a certain probability, high or low, as the case may be. But if it is true, it is clear that m must be present in the new case ($a-c-bd$) also, and that in the due proportionate quantity $c-m$. That is to say, the quantitative changes $a-c, c-m$ must coincide in time and space, and for this coincidence no reason appears. Its probability is wholly independent of the original probability of m , whatever that may be. The resulting probability that m really exists will

therefore be the product of these two probabilities, and will be proportionately diminished.¹

In two ways, then, the probability of the original induction is increased. On the one hand, the operation of *a* is observed under materially different conditions, eliminating certain opportunities of error. On the other hand, the hypothesis of error involves more complex suppositions than before, and these new suppositions are not such as to lend any support to one another. The separate inductions may therefore be taken as independently probable; and since the truth of one involves that of the other their joint probability is increased.

(ii) Qualitative variation.

If *ac* is a special combination of two causes known in separation, the above arguments are even increased in strength. An instance will best show the kind of combinations referred to, and the total independence of the elementary and derivative inductions. That liquids distribute pressure equally in all directions (*a - b*) results from certain simple experiments as at least an approximate truth. That either solids or liquids exert a downward pressure on their supports (*c - d*) is a familiar generalisation. That bodies lighter, bulk for bulk, than water will float (*ac - bd*) is another familiar fact which we know from observation, but which we could also infer from the two previous laws. In this case the resulting law (of floating bodies), taken in conjunction with the elementary law that an unsupported body falls, is confirmatory proof that liquids exert pressure upwards as well as downwards; for were it otherwise, we should have a contradictory result.

Now, in this case, if we assume an error in either of the simple laws (*a - b*, *c - d*), we should have to assume an exactly compensating error in the complex law (*ac - bd*). Or if we assume that *m* is the true cause of *b*, and *n* of *d*, we should have to suppose a combination *mn* to exist, and that in just the relation required, in order to give us the effect *bd*. In Pascal's experiment proving the equal distribution of pressure, the pressure is applied by a piston. Suppose the error to originate here through the introduction of some unnoticed force *m*, we should have to suppose a second error *n*, originating in a different manner, and accurately adjusted in quantity and direction to explain the laws of floating, a supposition which would be clearly gratuitous.

¹ The argument of course implies that we can find no *m* and *n* which vary concomitantly (cf. above, p. 384). We have then, in fact, a combination of the method of concomitant variations with the joint method as applied to each degree of the qualities.

Take another instance. Stimulating a nerve (a) we get a certain reaction (b). This reaction is a part of some wider function, say, of respiration or digestion. After section of the same nerve ($a = a c$), though the general process goes on as before, the particular function ceases ($\beta = b d$). The two experiments clearly confirm one another, and are as clearly independent of one another. An error which should affect the one would not affect the other. And the argument here is really the same as before, except that c is now a reversal of a — a being the introduction of the stimulus into a quiescent or normal state of things, and a ($= a c$) the removal of the same. Clearly, if a is the true cause of b , the removal (c) of a should also bring b to an end. Whence, from $a - b$ we infer $\alpha - \beta$, and from $\alpha - \beta$ we infer $a - b$.

Another case, in which a c means, in fact, the non-appearance of a when it would otherwise be expected, is the following. The attractive force of an electrified body (a) is inversely as the square of the distance (b). This is proveable by direct observation, namely, by means of Coulomb's torsion balance. That a charge is equally distributed on the surface of a sphere and tends to accumulate on points and edges is an independent induction ($c - d$). That no electric attraction is manifested within an electrified body ($a c - b d$) is also well known, and geometrical considerations prove that, granting the laws of surface distribution, this is only possible on the assumption that the attraction is inversely as the square of the distance, i.e. the second and third inductions necessitate the first. But they are obviously independent, not only in the sense that they take place under different circumstances, but that they are actually different laws.¹

Essentially the same principle appears in a somewhat different light in a very wide and important class of cases. Suppose we have a number of highly probable inductions, $M - N$, $O - P$, $Q - R$, and so on. We set about the analysis of these results, and we find that $M - N$ may be analysed into $a c - b d$, $O - P$ into $a e - b f$, $P - Q$ into $a g - b h$, and so forth. The result is a secondary induction, based on our first generalisations, showing that the relation $a - b$ is universal. The very same inductions go to show the precise modifications d , f , and h introduced by c , e , and g respectively into the relation $a - b$. Then $a - b$ becomes a true universal, and we use it now as a major premiss from which we deduce other relations $S - T$. But this is not all. If $S - T$ can be analysed into $a k - b l$, and if $k - l$ is known from other sources, the new case $S - T$ is a

¹ The above example was suggested to me by Mr. C. H. Oldham.

further confirmation of the principle $a - b$. And this may be stated generally. When we apply a principle to a fresh case, and find our calculations verified, if the context is such that it could not give the result found unless our principle were true, this is confirmatory evidence for the principle itself. In this case deduction is evidence, not only for the conclusion, but for the premisses.

Thus primitive experience teaches that by pushing and pulling we can move bodies ($M - N$); we also see bodies moved by the impact of others ($P - Q$); insufficient force fails to move a body ($R - S$), but has its effect, as is manifest when it is combined with another force ($T - V$). We form a mass of such crude generalisations. Then analysis begins, and we form certain simple generalisations concerning the relations of force and resistance, composition of forces, acceleration, momentum, etc. These principles, one or more of them, explain our common-sense knowledge, and enable us to infer further results as well. And if, further, we deny any of these mechanical principles, a contradiction will ensue. If we conceive any one force or law taken out of our system of principles, the remainder will fall to pieces, for we shall find effects without causes. If I can explain a motion m by the composition of two forces p and q , I cannot deny p and leave the rest standing. For if I know the effect of q , I must be aware that it would not produce m without p . So is it with any application of the mechanical laws, whether singly or in combination. I can infer the path of a projectile by calculating from the "impressed" force, the law of inertia, the action of gravity, and the resistance of the air. Ordinarily we assume these principles, and think only of the result as the thing to be proved. But if experiment confirms our calculation, it is also indirect evidence for the principles themselves. For, take away any one of the laws used in our calculation, and the effect of the remainder must be different. Suppose the law of inertia false, and there would be no curve described at all. Suppose the medium to offer no resistance, and the curve would be a perfect parabola, which it is not.

No single result can prove the principles from which it is calculated, but a combination of results may necessitate all the principles which we also use to explain them. The logic of the matter is simply this. We have first a set of crude and simple inductions which we may call primary. Comparing two or three of these, we arrive by a secondary induction at a law or principle. Another group gives us a second principle, and so on. Let our first principle be the connection $a - b$.

Now find a case $N = ac$ where by a second group of inductions c is shown to have the effect d no more and no less. If we find bd here, b must be due to a , and is therefore confirmatory evidence of the original principle. Of course, the belief that c will not give b is an induction, and may itself require confirmation, but this confirmation may in its turn be found in other instances. In this way a mass of primary inductions may tend to support one another through the medium of certain secondary inductions formed from them. These "secondary inductions" become in the order of logical explanation the first principles of the science; they are *πρώτη ἀξίωμα*, though not so *ἀπὸ*; and their strength is not that of any single induction, but of a concurrence of inductive results.

We can therefore corroborate our single inductions by combining them in two ways, namely, by examining the causes under investigation in different degrees or quantities, and again in composition with one another. To the variation of concomitants we have thus added variation in the causes examined themselves, and the errors which might affect inferences drawn from the one method would not apply to the other. Hence the more our results are interconnected after this fashion the higher their certainty becomes.

2. Composite inductions.

A simpler but in some respects weaker form of corroboration may now be described. We have hitherto considered the "context" of a generalisation $a - b$ as modifying the relation considered in degree or in kind. But there are many cases more naturally described by saying that the context makes "no difference" to the relation $a - b$. We then have the relation perhaps in very different "forms," but without the kind of variation discussed above.

The simplest form of corroborative induction is as follows. We have a number of inductions, $m - n$, $o - p$, $q - r$, $s - t$, all of them taken to be sufficiently established by the joint method. Then, by analysis and comparison we find a relation $a - b$ running through all these, and we infer this relation to be universal. Now, from one point of view, $a - b$ might be regarded as resulting from a single induction in which all the instances from $m - n$, $o - p$, and $q - r$, $s - t$ are premises. But it is also a link between four separate inductions, confirming them and justifying our view that they were adequately grounded. For the relation $a - b$ can be inferred from $m - n$, and $o - p$ alone; and using it as a principle we can (at least in part) determine the relations $q - r$, $s - t$ by deduction. And conversely, we can infer $a - b$ from $q - r$, $s - t$, and deduce

m - n, o - p from it. The result is that (so far at least as the connection of the elements is concerned) the four inductions stand or fall together—that is, they confirm one another. We may say that this merely means that they together form one wider induction; but this misses the essential point, namely, that the adequacy of the test used in each separate induction is confirmed by the remainder. If our different inferences collide with one another, that is a sign that they are inadequately tested. If, conversely, they support one another, this shows that the grounds on which each has been asserted are adequate.

Thus, *e.g.*, the broad principles of chemistry, the law of multiple proportions, and the principle that weight is permanent in changes of form, are usually treated as major premisses by which new experiments can be tested. But every new experiment is also an instance in support of them. A small proportion of the instances in which these principles have been verified would be a sufficient inductive proof of them. And every additional group may be regarded as a fresh induction converging upon the same result, and justifying the method already used. When a relation is generalised by the joint method, every fresh instance in which we find it is in some slight degree a confirmation: not because number of instances is as such a basis of generalisation, but because in every fresh instance the context is in some degree varied and the chances of error are thus diminished. But if a set of instances X is held sufficient to prove a law, and the same force is attributed to a quite different set Y, when X and Y are found to coincide in their results our original confidence in X is confirmed by a second induction of equal strength. We cannot, indeed, hold these two inductions to be as independent of one another as those previously discussed. It is conceivable that the same error might vitiate every instance observed. But we must remember that the suggestion of error must have its ground in experience of the failure of our tests. Hence, when inductions resting on a given test collide, that test is proved inadequate. Conversely, the adequacy of the test is guaranteed by success in different cases. Hence, when separate inductions resting on a similar test support one another, the credibility of the test is confirmed.

3. *Corroboration of particular facts.*

Any given content stands in many relations, and has many points of connection with reality. It has its grounds as well as its consequent, and it may have more than one consequent peculiar to itself, *i.e.* there may be more than one fact for

which it is in part responsible, which would not now exist if it had not been. Any one of these "points of attachment," as we may call them, may serve as an argument for the existence of the fact in question; and if any one such argument is insufficient, a combination of them may give us certainty. I believe the station which we have just passed is Didcot, because it is the first large station west of Reading. On looking at my watch I find that it is just an hour since we left Paddington, and I know that we are due to pass Didcot in that time. The inferences corroborate one another. A statement of Herodotus may be received with some caution, but if supported by the evidence of an inscription we doubt it no longer. That the earth is spheroidal we believe on several very distinct grounds. At the seaside the horizon grows more distant if we climb a cliff; and the masts of a ship appear before the hull. This might not be enough by itself, but it is reinforced by considering the apparent changes in the position of the stars, and so on. From the laws of evaporation we should infer that the air on the surface of the sea would absorb moisture. From the rain which the west wind brings we infer that it has absorbed moisture, and we find that it comes from the sea. The argument from the effect (rain) confirms the argument from the cause (the sea), and proves evaporation to be the link between them.

Putting the matter symbolically, we may have



where all the relations $a - b$, $c - b$, $d - b$ are probably universal. If this is so, and if we have ground for believing a , c , and d to exist, we have three independent proofs of the existence of b .

4. *The proof by construction.*

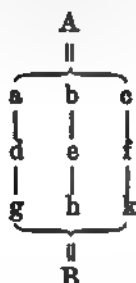
Both particular facts and general laws may be corroborated by the nature of the systematic whole which they form. To take the simplest case, let the sequence $A - C$ be certain or probable, but not immediate. Suppose we find B intermediate between A and C . Here alone is ground for supposing that the true causal sequence is $A - B - C$. Suppose, further, that we find independent evidence for $A - B$. This will necessitate the connection of B and C in order to explain the original sequence $A - C$. We may have this argument in any degree of complication. " A " may be analysable into a complex set of conditions; " B " into an interrelation of many agencies, and so on. That lightning (A) causes thunder (C) is a familiar but not a simple law. The mutual repulsion of the particles of

air and their subsequent collision is the required intermediary (B). The nature of the intervening link may be inferred on the one side by electrical laws from its cause, and on the other by the laws of acoustics from its effect. Inferring it from the effect, it corroborates by an experiment on the grand scale the disruptive effects of the electric discharge (A - B).

To take a familiar but more complex case. In breathing, inspiration is followed by expiration, and thus by a subsequent inspiration, and so on indefinitely. We can in some degree explain this rhythm. A nerve centre in the medulla is connected through motor nerves with the muscles of the ribs, diaphragm, etc. This centre is kept in continued activity by the presence of blood in its normal condition (i.e. not saturated with oxygen). Efferent impulses from the centre cause contractions of the muscles mentioned, which enlarge the cavity of the chest, on the one hand by the depression of the diaphragm (which can be seen from its shape to be an effect of its contraction), and on the other hand by expanding the ribs. This enlargement entails a diminution of pressure in the cavity, which causes air to flow in from the atmosphere, the oxygen of which diffuses into the blood through the thin walls of the capillaries; the expansion of the lungs sets up an excitation of the pulmonary nerves, which inhibits the action of the centre; the chest is then restored to its previous position, chiefly by virtue of the elasticity of the parts concerned; and the process begins anew. If, further, the amount of oxygen inhaled is below the normal the blood is less oxidised, acts with more vigour on the centre, and the breathing is quickened till the balance is restored. A similar result happens if the blood is losing its oxygen more rapidly than usual, while in the converse cases the opposite effect is found. In this way both the rhythmical character of the process and its adaptation to the circumstances or actions of the organism is intelligible. Of the details of this account, which of course might be prolonged to several pages, some are more, some are less, clearly made out by direct evidence. But what substantiates them in the main is that together they make up an analysis of respiration and an analysis of which the parts involve one another. Thus, e.g., the increase and decrease in the size of the chest cavity are postulated by the inward and outward passage of air, and explained by the movements of the ribs and diaphragm. These movements again are in part directly observed, in part (in the case of the diaphragm) inferred from the visible movements of the abdomen. The muscular movements again imply a nervous mechanism to regulate them, the nature of which we can in part trace by

anatomy and experiment. This mechanism once more must be regulated by the effects of respiration, or the automatic character of the process would be unintelligible. And here again observation supplies some of the links. The gain of oxygen by the blood in passing through the lungs is matter of observation, and it is explicable by the laws of diffusion; while lastly, the action of deoxidised blood on the respiratory centre is matter of experiment. Some of these points would be weak enough if they rested only on direct observation. Their strength lies in this, that what is indicated by anatomy or experiment is also postulated by the resulting facts in the way we have tried to indicate. If the thoracic cavity were not enlarged, what should force air in? if ribs and diaphragm did not move, how should the cavity be enlarged? how again can this movement take place except by muscular contraction regulated by an automatic centre, and so on?

We conclude, then, that the elementary connections building up a whole already known to be connected are corroborated by the fact that they do build up the whole in question. When your work is complete you can no more suppose a single connection altered than you can take a piece out of a Chinese puzzle and leave the whole standing. And it is clear, lastly, that the induction which determines the whole as a whole is independent of those which suggest the character of the elements and their connections. Symbolising, we have



where $A - B$ are known to be connected, a, b, c are the elements of A , and the simple relations $a - d$, etc., are inferred or inferable from other cases.

5. *The determination of the concomitants.*

Going back to our first account of the inductive processes, we can readily remind ourselves that uncertainty arose always from the indeterminate character of the action of the concomitants. In the method of difference there was no sufficient ground to deny that the concomitants $B C$ might co-operate

with A in producing the effect d. And even when grounds were shown by the method of agreement for denying this, the disproof could not, at least at first, be absolute. But when, from other instances,

BEF	BGH	CKL	CMN
bef	bgh	ckl	cmn

we get positive light on the behaviour of B and C, i.e. ground for determining their effects as such, our certainty with regard to the sequence A - d is materially increased. Conversely, the probability of the sequence A - d itself throws light—negatively, at least—on the behaviour of B and C. The negative instance BC and bc and the "agreement" instance AEF - def combine to show at once that A - d is universal, and that BC as such determines bc only. The result is that we have here a system of mutually determining universal judgments. Each judgment A - d, B - b, C - c has an effect upon the others. If we accept any two of them the third must follow, and the probabilities of each of the three are derived from independent sources. We have inductions determining B - b, C - c independent of that which determines A - d and supporting it. While conversely, the induction A - d taken alone is evidence for BC - bc, and taken together with B - b is evidence for C - c. This mutual determination is clearly coextensive with the whole range of reality, so far as we can observe and analyse it.

Hence the problem of induction is not that of finding some absolutely fixed points of certainty to begin with by means of which we can judge other things. It is a problem rather of finding a body of judgments not only consistent but mutually supporting one another. As this body grows, and the dependence of one judgment on another becomes clearer, the probability of the interdependent members, and therefore of the system as a whole, grows *pari passu*. The isolated induction is never certain. It is a probable result which, combined with other independent probabilities, approximates step by step to certainty.¹

To sum up, we have had five distinct ways in which inductions may be so interconnected as to support one another. Beginning at the bottom of the process we find—(i.) that since the difficulty of inductive proof consists in disentangling the

¹ This differentiates the method from Mill's *Method of Residues*, in which the effects of BC are supposed definitely known, and the residual effect is attributed to A. My point is that the residual or negative determination is mutual, and that thus the effects of A and of BC become clear *pari passu*. So far as A's effect is probable, so far also is that of BC, and vice versa. And by taking fresh instances in other contexts we may get converging grounds of probability for both.

effects of a mass of concomitant facts from one another, any induction determining the effect of any one concomitant determines at the same time the effect of the remainder. The generalisations thus formed are further tested (ii.) by combination with one another. In the simplest case such combinations may be represented as forming a single induction, but the fact that generalisations tested in a given way coincide with one another is a proof of the adequacy of the test employed. In higher cases (iii.) the "combined" laws differ in their working from their elements in such a way that the sources of error which might affect them are quite distinct from those which would affect their elements, and elements and deductions form a set of independent results which support one another. The composition of causes, and the quantitative variation of the cause, are the two main cases falling under this head. (iv.) Particular facts may be inferred by many distinct inferences from other facts with which they are connected by laws which are either certainly or probably universal. And (v.) lastly, both particular facts and the laws connecting them may be postulated by the structure of a known whole in which they are required as elements, and the inference from the structure of the whole may be an independent corroboration of direct inductions on which such facts or laws may also be grounded.

Briefly, then, we may say, to combine inductions is to strengthen them. At its lowest, the process is equivalent to welding separate inductions into single inductions of greater extent, and therefore greater strength. At its highest,—since there is no reason to suppose that the same error will affect a result, the same conditions limit a sequence, in different forms,—it amounts to a convergence of independent inductions each with a probability of its own, the result being always a higher probability for the connected whole. The convergence applies both to particular facts and general laws, to composite results and to the elementary principles which explain them. It rests in part on the connections and affinities between generalisations, and in part on the better determination of the effect of concomitants which makes each separate induction more certain. We may then restate the process of induction thus. The problem of thought is to make out the network of universal relations constituting reality. In working out this problem it is guided by two main principles. First of all, each fragment of reality with which it starts affords or may afford it certain grounds (on the principles called inductive methods) for judging a universal relation to hold. But secondly, the

judgments so formed are as such of various degrees of strength, and to prove their certainty they must run the gauntlet of one another. Negatively, they must not conflict. Positively, they must support one another. Such consistent or self-supporting results as are obtained thought takes as true.

It will illustrate this conception to apply it to the development of knowledge in time. We have already seen more than once that the theoretical requirements of logic demand precautions with regard to the inductive methods, which go far beyond the practice of scientific investigation. The reason of this is that logic has to make abstraction of the surrounding knowledge, which, in fact, qualifies every judgment and every method of forming a judgment in our intellectual world. In any actual, concrete case it is only such and such difficulties that are anticipated, while errors for which logic can see the abstract possibility are rightly put out of account in view of other knowledge on the subject. It is this fact which has tended to undermine the whole theory of induction—for each method at any point seems to postulate something else as known, and we no more come to the primary induction from which knowledge could be said to begin than we reach the horizon or the beginning of motion. But this receding, vanishing elusiveness of the beginnings of induction is explained when we consider that its results develop *pari passu*. A is not probable except in so far as B is likely; B depends on the unlikelihood of C, and so on. But we are not bound first to establish C, then B, and then A. The probability of all three emerges simultaneously from experience as an interdependent result. If we revert to Aristotle's simile, we should think not of a single soldier rallying from the rout around whom others gather, but of a wave of returning courage gradually animating the whole regiment, and bringing them by degrees but simultaneously to a stand. There is no *πᾶσις ἐν τῇ ψυχῇ καὶ λῶς* in the sense of a fully determinate, fixed, and certain universal judgment standing in isolation and ready to give a hand to the next corner; but there is always a mass of partly formed, more or less definite, more or less certain, judgments, which gather clearness, connection and strength as a body.

And thus we may conceive the inductive process from its elementary beginnings to its ideal completion something after this fashion. Beginning with the tendency to generalise the observed relation as it comes, it finds its results continually corrected by one another. This correction will sometimes amount to an entire overthrow, sometimes to amendment or limitation. Proceeding with its corrected results, it continues

the process till it finds some that will hold throughout experience. Meanwhile, rendered reflective by consciousness of mistakes, it traces errors to the neglect of the character of the contents and their concomitants, and for the future it remedies this neglect by the "scientific methods" in which the counter-suggestions of experience are carefully eliminated before any result is taken as established. The results now obtained support one another in two ways. For, first, the exacter knowledge of the effect of the context makes each separate sequence more definite and certain; and secondly, the combination of established sequences gives *a priori* ground for accepting results established by independent inductions. The resulting system, worked out ideally for all experience, and with all its points of interconnection clear and certain, would be the ideal knowledge; worked out clearly and definitely in this or that body of truth (such, perhaps, as mathematics and physics), less coherently and definitely in others (such, perhaps, as physiology), and strongly but indistinctly felt rather than pointed out in the great bulk of our "common-sense," everyday beliefs, it constitutes the knowledge which we actually possess.

The result of combined inductions is a body of scientific truth. It is difficult to define science so as to distinguish it from ordinary knowledge. Perhaps it may be said to begin when we mark out a tolerably distinct subject (*γένεσις*) for systematic inquiry (*μεθόδος*), i.e. its beginning is in the intention of the inquirer. Nor is science complete till we are able by long chains of deduction to infer the individual fact without need of verification. But a mass of assertions may be said to constitute a body of determinate scientific truth at the moment when, by the consilience of inductions above described, they come together in such wise that for the future they all stand or fall at once.

From this we can at once understand the nature and validity of our confidence in those assertions which we call scientific. The isolated induction we have had to admit, however much it may approximate to certainty, can never, strictly speaking, reach it. But the failure of an isolated induction is no evidence against a connected system. For, first, the former may always be held open to doubt on the ground of opposing evidence from cognate matter, or even of the unknown character of such matter. But *ex hypothesi* all such evidence is in favour of each member of a connected system. And so far as the systems remain separate, the permanence of each is an element of strength for all; while so far as all the sciences can be

taken as building up a single system, that system has a unique character to which no analogy applies. In one word, with the connection of inductions we have science and certainty. And secondly, the argument to the possible failure of inference A from the admitted failure of inference B is a kind of argument by analogy, and is strong in proportion as the case A resembles that of B, weak in proportion as they differ. But if the difference is according to experience essential, if, that is, it is uniformly followed by a difference in the conclusion, there is really no argument at all.

Now, the fact of consilience is an essential difference, and so the breakdown of a single induction is not evidence against a connected system. And since each new consilient member makes a difference to the certainty of the result, we cannot argue from the breakdown of a relatively weak nexus of inductions against one which is complex and strong; and the more complex and strong a body of inductions is, the more wholly it will be removed from arguments of this kind. The more, then, in any system the several inductions support one another, the more numerous these inductions are, and the stronger each separate member of the system, the more the case is removed from any analogy with minor systems which may have proved deceptive. Genuine scepticism as to inductive science could therefore be motivated only by the total disruption of a great mass of belief resting on a consilience of inductions. I cannot but add that, conversely, the disruption of great masses of belief which do not rest on consilient inductions is for the inductive logician the negative instance which goes to consolidate his own theory of the conditions of knowledge.

Lastly, the extent of possible error in a well-grounded induction must not be exaggerated. Suppose a careful induction, i.e. one that has applied every test suggested by experience, to be reversed. This will mean in effect that it is the strict universality of the relation that is disproved,—the exhaustive enumeration of the conditions. But that the induction should "have nothing in it," that it should not be an approximation to truth, give us no universal holding for a very wide area, or something very near to the totality of conditions, will be scarcely conceivable if our preceding account of induction and its relation to probability be accepted. Thus, e.g., Boyle's law continues to express an approximate truth, though some further condition has to be taken into account which Boyle did not find out. Or again,—to give only one instance of the commonest form of correction of old truth by new discovery,—the common-

sense belief that heavy bodies fall fastest is far from being wholly upset by experiments in *vacuo*. A condition is inserted (namely, that there must be a resisting medium) unnoticed by common sense, and the principle on which the facts rest is accordingly conceived in a modified way. But the original induction contained approximate truth. Our point, then, is that against the claim to be approximately true counter-evidence from failure of this or that induction breaks down. To make these points clear, we may distinguish three ways in which a systematised science may be conceived as modifiable.

(a) The real totality of conditions on which its results at any given point depend may not be known. That is, in effect, the conditions pertaining to the human area of investigation, and perhaps certain others with them, have not been eliminated. Now, if this is so, no one knows it so well as the student of that science, if he understands his business. And accordingly, "modifications" in points of this kind are not really reversals of his results as he will state them at all, but a mere filling up of blanks in his knowledge. In this case, then, modification is always possible; but, on the other hand, in no way interferes with the certainty already arrived at. The case is nearly parallel with common-sense knowledge, where we are concerned mainly with practical results, and do not care to give an exhaustive account of conditions. Here, again, common sense, so far as it understands itself and its limitations, is not really negated by the discovery of cases in which its results do not hold. It gave what was for its purposes the best working rule, and that was all its business. It is now more clearly defined and limited, and that is all.

(b) But now suppose a science to consider itself to have arrived at the true totality of conditions for a given set of results, so at least as to know where alone modification can be found. Is it inconceivable that there should be any mistake here? May not this or that result, which appears so woven into the system that all must stand and fall together, nevertheless turn out capable of a modification which will injure nobody? Possibly; but if so, it must be our constructions and analyses which in this case are defective, and which gave this judgment an unreal strength of connection not its own. The isolated act of analysis may be faulty, like the isolated induction. Here again, then, if the meaning is that the single result alone may be modified there is no attack on the body of the system as such. If, however, this possibility is also raised, we must reply that it can be logically grounded only on the complete overthrow of an equally well-established science.

If we can imagine a whole science, such as the science of electricity or of optics, proved to be nothing but a network of illusion, destitute of any sort of validity, we might argue that other sciences were equally false. But, apart from an "instance" of such a kind, what ground could scepticism logically take?

And what holds for the whole system must apply to any members of it connected with the rest, not by an isolated analysis like a single deduction, but in manifold interweavings of correlation. I should say, then, simply that in view of the essential difference between a scientific system and such inductions as have been found to err, the suggestion of error in the former, understood as it should be understood, with all the limitations suggested by induction itself, should be simply and categorically rejected.

(c) If reasons could be found against this view there would remain a further point. Error, we have found, applies to exact results, not in the case of well-grounded induction to approximate results. If, then, on the ground of the limitations of induction, error were to be imputed to science, it must apply to the exactitude of its results, not to their approximate truth. To deny even approximate truth to the best systematised science would be to put yourself at the furthest possible remove from all reasonable evidence. If I were convinced that accuracy was no more to be found in science than elsewhere, I should still say that in inductive science we had the nearest approximation to reality.

We have now reached the point where the requirements of our principle of induction are fulfilled. In the first rough arguments of simple enumeration, reasons for a generalisation could always be met by counter-reasons. We could always argue from the possibility of a change in concomitants. The next step, therefore, which landed us in scientific induction was to eliminate this possibility. All strong and direct reasons for the relevance of any concomitant could, under favourable circumstances, be met, we found, by such a method. But there remained the bare possibility of failure based on the inadequacy of observation. The strength of this possibility could only rest on experience of failure, and to meet it we had recourse to a further principle—that of combining induction with induction. When such combination is effected, as it would seem to be in some of the physical sciences, counter-considerations are replaced by a consilience of reasons for the same conclusion, and the requirements of our principle are more than fulfilled.

CHAPTER XVII

INDUCTION AND HYPOTHESIS

WE have now completed our positive account of induction as a method of obtaining truth with certainty, and upon this method we believe the bulk of well-established scientific knowledge to rest. We have still to inquire into the character of those methods which with varying, in some cases with very high degrees of probability, establish results which yet, owing to the peculiarity of their subject-matter, cannot be subjected to the whole of the inductive tests with the completeness which we have hitherto demanded. I treat this branch of the subject here, first, because it completes our account of induction; and, secondly, because it will illustrate by contrast the method of combining inductions which has just been described.

1. To take the second point first. Briefly our method might be described as one which starts with a hypothesis which it continually modifies and strengthens by repeated verification. And this forms a point of contact for our theory—which started from the view of induction which will always be associated with the name of Mill—with the rival account which originated with Whewell and Jevons, and which has gained the authority of Sigwart and, with important limitations, of Mr. Bosanquet. Let us, then, consider this theory in relation to our own. According to Jevons' well-known view, induction is really an inverse deduction,¹ and one of questionable legitimacy. In deduction you know, or take as known, certain universal truths, and applying these you draw your conclusions. In induction, on the contrary, you know your conclusions (*i.e.* the particular facts), but you do not know the laws or principles upon which these depend. But you believe (on what general grounds does not matter at present) that there must be some general principles to explain these particulars, and accordingly you invent some. This is your hypothesis. Then you apply your hypothesis, perhaps combining several hypotheses,

¹ *Principles of Science*, bk. i. chap. vii

perhaps filling up the blanks which your hypothesis has given you by certain observable data, and thus get certain conclusions.¹ These conclusions, lastly, you compare with observed fact, and, if they tally, your hypothesis is a good one, and may be taken as more or less established. If they do not tally, the hypothesis is at once dethroned and you must make another.²

This procedure is, by the confession of its authors, in a strict logical sense illegitimate. We must just remind ourselves of the reason. Put in the way of formal logic, the reasoning commits the fallacy of "affirming the antecedent on the ground of the consequent," a fallacy which is essentially parallel to that of "simply converting an universal affirmative." Put simply, the argument runs, "If A is true, B will be true. But B is true. Therefore A is true." "If the witness said it," ran the thought in Mr. Justice Stareleigh's mind, "I should have taken it down. But it is in my notes. Therefore he said it." If you take poison you die. But you will die. Therefore you will take poison. If at one time the climate of Europe was Arctic in character, fossil remains of "Arctic" animals would be found. They are found. Therefore the climate of Europe was Arctic. If marriage by capture prevailed in a primitive tribe, some symbols of capture would be likely to survive in its civilised descendants. In civilised Rome the marriage ceremony was a pretence rape. Therefore the primitive Latins captured their wives. The growth of population tends to lower wages. Wages are low in Ireland. Therefore its population has grown.

We need not multiply instances. The above will be sufficient to show that this form of argument suits good and bad inferences equally well. This is an objection which is not met by admitting, or rather insisting with Jevons, that induction gives us merely probable truth. We have already argued that probability must have a definite degree, and the stoutest opponent of induction could scarcely deny that some of its generalisations are more probable than others. But the hypothetical or inverse deductive mode of argument entirely fails to explain this difference. Whatever argument you throw into such a form has precisely the same flaw, and as an argument is worthless. It gives neither certainty nor probability: it gives in strict logic nothing at all. The inverse method, taken just as it stands, does not, I venture to think, distinguish between the plausibility of rhetoric and the probability of logic. The hypothetical form of statement is one which the mind

¹ *Op. cit.* bk. ii, chap. xi.

² *Op. cit.* bk. iv, chap. xiii.

easily follows, and is therefore plausible. But the precise business of good reasoning is to get rid of plausibilities, or at least to get beneath them and analyse them. If it is replied that this is taking a very formal view, that after all the form of an argument need not concern us, and that materially sound reasoning is just as sound whatever way you put it, we shall rejoine that this position may quite fairly be held by the man of science to whom the particular truth, and not its ultimate epistemological grounds, is the essential thing; but if this is also to be the attitude of the logician, why have a logic at all? Logic, according to the view which we have contended for all along, like any other scientific inquiry, has to explain the facts. What are the facts of logic? Certain judgments and inferences. In this case we are concerned with inferences. These inferences are correct or incorrect, or, on the very minimum admission, at least more or less probable. Then the business of logic is to explain this more or less of probability. To fail in that is simply a confession of inadequacy.

It will be replied that Jevons does not leave the inverse theory in the naked form in which we have stated it, but that he infers the probability of the suggested cause in accordance with the theory of chances. Now an argument of this kind is quite possible, and is, in fact, frequently used, as we shall presently see, but as Jevons puts it, i.e. in the form in which the inverse method requires it, it is unsound. Jevons tells us, that "the most probable cause of an event which has happened is that which would most probably lead to the event supposing the cause to exist; but all other possible causes are also to be taken into account, with probabilities proportional to the probability that the event would have happened if the cause existed."¹ That this statement represents the true probabilities of the argument from effect to cause, we must directly deny. It leads at once to manifest absurdities. An acquaintance is dead, and I know nothing of the cause of his death. If he was shot through the heart he would certainly have died. Am I therefore to conclude that he was murdered? If he had typhoid fever he might or might not have died. Can we on this ground compare the probability of his being murdered with that of his dying from typhoid fever. Suppose I still know nothing of the cause of his death, but am aware that he had been in the centre of cholera infection. Most people would think it not improbable that he died of cholera. But on Jevons' principle it is much more likely that he was murdered, for cholera is not always fatal.

We need not multiply instances. It is clear that Jevons'

¹ *Principles*, vol. i. p. 279.

principle only takes one side of the matter into account. You must not only consider the probability that a certain antecedent would, *if it existed*, produce this result, but must also consider the probability *that this antecedent does or did exist* as compared with alternative probabilities. In fact, Jevons, like a good reasoner, always does consider both points in his illustrations. Thus in explaining Kirchoff's proof of the presence of iron in the sun, we have the two alternatives before us of a casual coincidence of sixty lines in two spectra, and on the other hand of an "explanation" of this coincidence by the presence of iron in the sun. Now, *either* a coincidence (between the spectral properties of some other substance with iron) *or* the presence of iron would equally explain the result, i.e. the result would be necessary in either case, and there is no question of the degree of probability with which the effect might be inferred from the hypothetical cause. The improbability attaches really to the suggestion that the "other" substance exists, i.e. that there should be so remarkable a coincidence without fundamental community of nature.¹

Jevons' principle enters into account in certain complex cases of which he gives instances, and which we may explain in this very simple way. Suppose an event *a* for which we require the cause. Two antecedents are suggested as possible, A and B. There is nothing to show that A is more likely to happen than B. They are, as far as our knowledge goes, equally frequent. But A is the true ground of *a*; i.e. given A we get *a* universally, while B is not always followed by *a*. This will mean that if we assume B we shall also have to assume some other conditions, positive or negative, i.e. we must assume a coincidence of B with something else. But if B as such is not commoner than A, B in such surroundings will be *less* common than A. Hence there is a reason, weak or strong as the case may be, for preferring A.²

Attending carefully to our reasoning when we infer from

¹ I do not here inquire whether this is the full logic of the argument. See above, Chap. XI, p. 312, note.

² We may perhaps so extend this account as to bring it into relation to every case, at which point Jevons' principle, slightly reworded, will become identical with ours. If A and B are in themselves equally likely, but assuming A we must also assume C, while assuming B we must suppose D, then the probabilities of A and B will be as the probabilities of C and D. Thus assuming iron in the sun (A), we explain the solar spectrum *a*, with no further assumption but that of the uniform nature of iron (C), which may be regarded as certain, i.e. as giving the limiting case where there is no really fresh "assumption" at all. On the contrary, assuming another substance (B), we must assume a coincidence in spectral characters (D), the odds against which are a trillion to one. The argument here may be put in Jevons' form, because we begin by supposing A and B equally probable. But if B were much more

an effect a cause which we cannot directly observe, we must admit that the logical starting-point is not, what Jevons would have it, a supposed cause, but the effect itself, along with whatever we know of its cause or causes, their probability or frequency, from parallel cases. Doubtless the cause suggested must explain the effect; that is a preliminary condition. But more is required before proof even begins: the effect must probably or certainly imply the cause. And as is the strength of this implication, so is the probability that the cause suggested is the true one. When the Cornish peasant attributes the moaning and howling of a stormy night on the Bodmin moors to the giant Tregeagle, the unjust steward who is condemned to empty Dozmare Pool with a limpet shell, it may be quite true that if Tregeagle existed the noise would be explained. A giant who could stride from Castle Andinas to St. Agnes Beacon, and from St. Agnes Beacon to Carn Broa, might well fill all Cornwall with his lamentations. But we who have never met a giant like Tregeagle, but have often heard the wind howl, will probably prefer a more prosaic explanation.

We shall consider presently the logic of the argument from effect to cause. For the present we wish to point out, (1) that even this argument is not logically an "inverse" method, but an inference from known facts to a suggested ground. And (2) we must insist that it is far from being the normal type of inductive inference—so far that it cannot exist at all without presupposing inductive results of another kind. For how could I argue that a suggested cause will explain a given effect unless I already know the causal relation used in this "explanation." How could Newton suggest that gravity would explain the motions of the earth if he were not already familiar with its laws as affecting bodies on the earth's surface? The cause A suggested to explain the effect B may be simple or complex. If simple, it must resemble simple causes the effects of which are already known. If complex, it must be a construction of such causes. But how are such causes known? How do we learn the effects of inertia, gravity, friction, or any other elementary agent? How do we get the results of artificial selection from which the explanation of the development of plants and animals by natural selection takes its start? The inverse method works with known causal laws. It may construct elementary laws into a complex whole, and so "prove"

probable than A we should have to measure off its strength against the weakness of D. The result in any case really is that we have to be guided by the probability that the whole AC exists, as against the probability that BD exists. Jevons' view as formulated by him confines itself to one part of this whole.

a derivative law, but to be even plausible it must have its elementary laws to work with. In fact, deduction, and hypothesis so far as it uses deduction, require at least certain elementary universals to form their constructions. Without these they "will not march." But these elementary laws must come from induction. Hence the "inverse method" can only work if a different method has gone before it.¹

Thus even admitting the merely probable character of induction, we should have to reject the inverse method as inadequate; since the result of such a method is neither probable nor certain, but merely plausible, i.e. for logic it is *nil*. But we cannot admit the postulate. If our best established

¹ This point seems to me the main weakness in Mr. Bosanquet's otherwise useful account of induction. "Inductive proof," he tells us (*Logic*, vol. II, chap. v, p. 177), "rests, like all inference, on systematic and necessary connection of content. The observations do not give us the connection, but we judge the connection on the basis of the system demanded by the observations, and this systematic or reasoned judgment is the essence of proof." I confess this sentence puzzles me. If it means that observations do not give us the system of themselves, i.e. without analysis, comparison and other acts of thought, of course I agree. But it seems to mean more. It suggests that the observations are not the facts which prove the system, still less do they suggest the system; but we have, as it were, a system, or perhaps two or three systems on hand, and we try these until we find one that fits. This we retain, while the others (I imagine) we dispose of as *reductioes*. I hope I am wrong, but all through Mr. Bosanquet's great work I am haunted by a system which is always operating in a powerful and effective manner, while its origin and validity are wrapped in what is to me total obscurity. I am quite at one with Mr. Bosanquet in thinking—or, to be more accurate, I have learnt mainly from him to think—that the work of thought is to form the real world into a connected system. But I suggest that if we are to have a fabric we must have the thread to weave, and the tools to weave with. On my view, the thread is the world of sense, and the tools the activity of thought; but what Mr. Bosanquet's thread is I cannot make out, and it is just in the theory of induction that my difficulties come to a head. (See, however, below, p. 419, note.)

It is noteworthy that Jevons, in his chapter on Hypothesis (*op. cit.* bk. iv, chap. xxiii), fully recognizes that the *modus operandi* of the cause suggested must be known *afande*. "If, in order to explain certain facts, a, a', a'', etc., we invent a cause A, then we must in some degree appeal to experience as to the mode in which A will act. As the objects and laws of nature are certainly not known to the mind intuitively, we must point out some other cause B which supplies the requisite notions, and all we do is to invent a fourth term to an analogy. As B is to its effects b, b', b'', etc., so is A to its effects a, a', a'', etc." This recognizes our point. But Jevons does not seem to have considered its bearing on his general theory.

The attempt to prove a simple law by the inverse method could only resolve itself into something of this kind. "If all A is B, this A will be B; but this A is B, therefore all A is B." If matter has the property of gravitation, the matter which we see will gravitate. It does so; therefore gravity is an universal property of matter. But this is simply a longwinded and tautologous way of saying, "If some A is B, all A is B." In fact, at this point the inverse method reveals itself definitely as a simple inference from "some" to "all." And that is at bottom its real character.

It will be understood that I attack Jevons' view only as a final analysis of induction, and am far from denying it considerable value of its own.

the process till it finds some that will hold throughout experience. Meanwhile, rendered reflective by consciousness of mistakes, it traces errors to the neglect of the character of the contents and their concomitants, and for the future it remedies this neglect by the "scientific methods" in which the counter-suggestions of experience are carefully eliminated before any result is taken as established. The results now obtained support one another in two ways. For, first, the exacter knowledge of the effect of the context makes each separate sequence more definite and certain; and secondly, the combination of established sequences gives *a priori* ground for accepting results established by independent inductions. The resulting system, worked out ideally for all experience, and with all its points of interconnection clear and certain, would be the ideal knowledge; worked out clearly and definitely in this or that body of truth (such, perhaps, as mathematics and physics), less coherently and definitely in others (such, perhaps, as physiology), and strongly but indistinctly felt rather than pointed out in the great bulk of our "common-sense," everyday beliefs, it constitutes the knowledge which we actually possess.

The result of combined inductions is a body of scientific truth. It is difficult to define science so as to distinguish it from ordinary knowledge. Perhaps it may be said to begin when we mark out a tolerably distinct subject (*γίγας*) for systematic inquiry (*μίσθωσις*), i.e. its beginning is in the intention of the inquirer. Nor is science complete till we are able by long chains of deduction to infer the individual fact without need of verification. But a mass of assertions may be said to constitute a body of determinate scientific truth at the moment when, by the consilience of inductions above described, they come together in such wise that for the future they all stand or fall at once.

From this we can at once understand the nature and validity of our confidence in those assertions which we call scientific. The isolated induction we have had to admit, however much it may approximate to certainty, can never, strictly speaking, reach it. But the failure of an isolated induction is no evidence against a connected system. For, first, the former may always be held open to doubt on the ground of opposing evidence from cognate matter, or even of the unknown character of such matter. But *ex hypothesi* all such evidence is in favour of each member of a connected system. And so far as the systems remain separate, the permanence of each is an element of strength for all; while so far as all the sciences can be

taken as building up a single system, that system has a unique character to which no analogy applies. In one word, with the connection of inductions we have science and certainty. And secondly, the argument to the possible failure of inference A from the admitted failure of inference B is a kind of argument by analogy, and is strong in proportion as the case A resembles that of B, weak in proportion as they differ. But if the difference is according to experience essential, if, that is, it is uniformly followed by a difference in the conclusion, there is really no argument at all.

Now, the fact of consilience is an essential difference, and so the breakdown of a single induction is not evidence against a connected system. And since each new consilient member makes a difference to the certainty of the result, we cannot argue from the breakdown of a relatively weak nexus of inductions against one which is complex and strong; and the more complex and strong a body of inductions is, the more wholly it will be removed from arguments of this kind. The more, then, in any system the several inductions support one another, the more numerous these inductions are, and the stronger each separate member of the system, the more the case is removed from any analogy with minor systems which may have proved deceptive. Genuine scepticism as to inductive science could therefore be motivated only by the total disruption of a great mass of belief resting on a consilience of inductions. I cannot but add that, conversely, the disruption of great masses of belief which do not rest on consilient inductions is for the inductive logician the negative instance which goes to consolidate his own theory of the conditions of knowledge.

Lastly, the extent of possible error in a well-grounded induction must not be exaggerated. Suppose a careful induction, *i.e.* one that has applied every test suggested by experience, to be reversed. This will mean in effect that it is the strict universality of the relation that is disproved,—the exhaustive enumeration of the conditions. But that the induction should "have nothing in it," that it should not be an approximation to truth, give us no universal holding for a very wide area, or something very near to the totality of conditions, will be scarcely conceivable if our preceding account of induction and its relation to probability be accepted. Thus, *e.g.*, Boyle's law continues to express an approximate truth, though some further condition has to be taken into account which Boyle did not find out. Or again,—to give only one instance of the commonest form of correction of old truth by new discovery,—the common-

essentially the formation of hypotheses to explain results is to distort its character.

Two brief illustrations must suffice. We may determine the path of a motor impulse almost with certainty from the Rolandic region through the corpora striata and the crura cerebri; we can assure ourselves that it crosses at the foot of the anterior pyramids, and descends the cord by the lateral column of the opposite side. We can see it, mentally, issuing through the anterior root and descending the sciatic until it reaches the muscle of the lower leg, which it is its business to set in motion. Now no whit of this is matter of direct observation, but all of it consists of a piecing together of a mass of inductive results. If we wish to go further into detail in determining the path,—to consider, for instance, whether this or that ganglion cell has a hand in it, or whether the impulse is conveyed directly by the fibres of the white matter,—we must piece out our information by probable reasoning and analogy. But up to a certain point we can elaborate a conception which does little more than embody in a single whole our ascertained results, at most piecing them together by the conception of continuity. Here, then, we have the construction of a conception from a mass of data. The conception is not a supposal, not a hypothesis; it is a conclusion.

Contrast this case. The practice of exogamy is found in connection with totemism, and with other indications of a state of society in which descent is reckoned through the mother only. We know that marriage by capture is very common among primitive peoples, and the same is true of female infanticide. If we suppose, in the case of every tribe practising exogamy, that female infanticide was at one time so common as greatly to reduce the number of women bred up in the tribe, we can imagine marriage by capture from another tribe becoming so universal a custom as to acquire a traditional sanction, and to be the only form of marriage recognised as allowable. The women so captured would have different totems, and their children would inherit these totems (not the father's). But this totem being the mark of the foreign tribe would sanction marriage, and hence we get the remarkable system of exogamy under which you may marry anybody except those of the same totem. Now here we have a result, exogamy, explained by supposing an anterior state. For this anterior state we have no direct evidence, and the explanation is therefore conjectural. So far as it has probability, that depends on the analogical reasoning (the value of which it is not my business to determine) which suggests the practice of female infanticide on the scale required.

So far as it is "mere" hypothesis, it is not a conclusion but a supposal.

3. The tendency to identify induction with hypothesis gathers strength from the particular form of inductive reasoning which argues, not from cause to effect, but from effect to cause. For here the cause is identified with the true logical ground and the effect with the consequent. Thus when the effect is given and we wish to argue to the cause, the process reduces itself to the inverse method. All we can really say is, "If A existed B would come about, but here is B; well, then, assume A to have existed, and no difficulty arises." B is explained, and no further explanation is required. But this, as we have seen, is not proof; it is not even argument; it is merely a way of obtaining intellectual comfort.

How then do we argue from effect to cause?—By the same reasoning which leads us from cause to effect. If and so far as the effect is a true logical ground which will take us to the cause as consequent, the inference holds; and if not, not. We may exhibit the argument in several distinct cases.

(α) If an effect α is known to have several distinct causes A, B, C, its existence as such is obviously no ground for inferring A rather than B or C. But if A is the only known cause of α , the case is different. The inference $\alpha - A$ is then a generalisation precisely like $A - \alpha$, open to the same doubt and susceptible of the same tests. If α is not found unless A has gone before (negative instance), and if α is found preceded by A (positive instance) in very diverse contexts ("agreement" instances), it becomes probable that the connection is not due to any extrinsic circumstances, but is universal. In short, if no concomitant of α can be pointed out which is relevant to the mode of its causation, we must infer that it will have the same cause in every case.

The generalisation $\alpha - A$ may be very strong. Thus no instance, in all the multiplicity of cases and contexts in which observation has been made, has ever yet succeeded in detecting any cause for the existence of an organic being except the previous existence of some other organic being. Hence whatever may be our views on the absolute universality of the relation, or on our right to apply it in remote epochs to different physical conditions, no one would agree with Topsy that she "grewed," nor, generally, could we doubt that if flora and fauna are discovered on an island they or their ancestors must have got there from somewhere. There are no autochthones. Here, then, we have the simplest case of argument from effect to cause, which is simply the application of a wide generalisation under the joint method.

(b) The case becomes a degree more complex when the effect to be explained is a whole of which the elements are known to have several causes, but of which as a whole nothing is known directly. Thus the effect C to be explained may be analysed into the elements $\alpha\beta$. And α may have causes ABC, and β , causes CDE. It is clear that assuming C we can "explain" both α and β , and what probability this alone gives us in favour of C we shall consider immediately. But if, further, we can show that A and B would have consequences incompatible with β , while D and E have consequences incompatible with α , we have proved C to be the true cause.¹

This is of course the ordinary case of proving a hypothesis by means of excluding its rivals, and is only one form of a process which we have seen at work throughout inductive inference. The phrase, indeed, as used by Mill,² has given rise to a not unnatural misunderstanding. It has suggested that we must exhaust our imagination in endeavouring to invent hypothetical explanations of a given fact X, and after refuting all but one, then, and then only, might we say that that one is the true explanation. But this obviously would lead on to infinity. You would never be theoretically certain that the wit of man had not the capacity for imagining some further theory. And clearly there is no reference in a logical proof to what a man can or can not imagine. The question is, What do the facts themselves render certain or probable? And here we come to the true meaning of the requirement. As long as any data to be explained, either of themselves or in relation to the remainder of our experience, suggest alternative principles, so long neither of these principles can be regarded as certain. But the gradual consolidation (by fresh discoveries, or analysis, or what not) of the one principle, will itself detract from the probability of the other; and when, though only when, every such alternative principle has been disproved, the remaining principle is assured. For any other hypothesis, though perhaps imaginable, would *ex hypothesi* have no evidence to support it in the facts themselves, i.e. it would be an unmotivated possibility. At every stage in induction we are discarding possibilities of this kind, the truth in effect being, in all *rigid* inductive argument, that what tends to prove a tends to disprove anything other than a. Our inductive results, then,

¹ That is to say, assuming the original inductions which connect α with either A, B, or C, and β with either C, D, or E. The logic of these inductions is identical with that of the first case, except that the conclusion is disjunctive.

² *Logic*, bk. iii. chap. xiv.

must not only explain the facts, but must be the only explanation compatible with the facts.¹

So far of cases where either from the beginning or in the result only one cause is suggested by inference from the facts. To complete our account, we must notice the probable arguments which arise where many causes are possible.

(c) If α is produced indifferently by A, B, C, and all I know about a certain case is that it is qualified by the presence of α , then I have no ground for preferring A, B or C as the cause in that case. Death is caused by hundreds of things; and if I find a man dead, I have not the shadow of a right to conclude that he was murdered. But now suppose that our experience is carefully registered and analysed, and that in this experience α has been caused by A in the ratio of 20 times, by B 10, and by C once; then, if I see α , I have some reason for presuming

¹ It is a little difficult to make sure of the position of these writers who have defended what I may call the "hypothetical" view of induction. Whewell, who is often regarded as one of its strongest exponents, seems partly aware of its logical weakness, and makes the not unreasonable suggestion that consistency of very diverse results should be taken as true, and that on the ground that you could not, in the history of science, find an instance of such a consistency turning out false (*Philosophy of Discovery*, vol. ii p. 60 ff.). This, as far as it goes, is a way of saying that experience gives us no counter suggestion, and provides at least a *modus vivendi* between his view and our own. Mr Bosanquet's account of induction I have already alluded to. He expressly ranges himself on the side of Whewell, Jevons and Sigwart, but for which I should have regarded him as an ally rather than as an enemy. His account of perceptive analysis (vol. ii chap. iv.) corresponds to the forms of comparison, etc., required by the experimental methods, and in the part played by the theory of chance and the enumeration of instances, I find myself in close agreement with him. Again (chap. v. *passim*, see, e.g. pp. 164, 166), he lays down that the data must be in effect so "extended" as to "include" the hypothesis. I cannot, therefore, think that on the whole there can be any substantial difference between his view and that of the text. Sigwart's view (as Mr Bosanquet points out) appears to fluctuate. He never, so far as I can discover, clearly states whether induction does or does not prove anything. In general, he adopts the "hypothetical" view, agreeing as he explicitly states with Jevons. But he appeals sometimes to coincidence of quantitative variation, sometimes to complex correspondence of deduced result with fact, and sometimes again to principles which are in effect those of the joint method or its elements.

Since I wrote the above, Mr. Bosanquet's *Essentials of Logic* has appeared. This masterly sketch throws for me at least considerable light on some of the most difficult points in the writer's views, but at the same time appears to me to render the final inadequacy of his theory of science fatally apparent. It is now clear to me (1) that Mr Bosanquet intends us to find "the system," somehow in the facts which we know (p. 140), but this position collapses hopelessly with (2) the denial of any certain generalisation except that "by determination," i.e. by tautology. If we cannot generalise observed results we can have no knowledge outside the memory series. To give up the attempt to explain generalisation is to evade the chief crux of logic. And as to "the system," generalisation is one of the main strands that run through it, and not its parts together. Without generalising how can we use the facts that we know as evidence for the character of those that we do not know, i.e. how can we form from the part a system which shall comprehend the whole?

that A has gone before, and very strong ground for believing that either A or B was its cause. A child tells me that he has seen a man seven feet high. The statement is a fact for which there are two possible explanations. The first is that it is the truth. The second is that the child exaggerated. Now there are not many men seven feet high, but children often exaggerate. Most of us therefore would prefer the second explanation.

(d) We proceed to a more special case, which may be called the explanatory method¹ proper. This depends not on a direct generalisation from effect to cause, but on a construction of generalised relations, and is the argument which falls most naturally into hypothetical form. Suppose, as before, that we have two effects α and β of each of which we know the causes exhaustively. Let the causes of α be M N O, and those of β , O P Q. Then O, and only O, produces both α and β . Now let us observe both α and β together. The obvious conclusion is that O is their cause ("O will explain both"), but this is going a little too fast. A combination of M and P would also explain both, so again would N and Q, and so on. Supposing each "cause" M N O P Q to be equally probable, i.e. equally frequent, a combination of any two of them, as M P, will be much less frequent than the occurrence of any one, M or P.² But there are four combinations, M P, M Q, N P, N Q, which will give $\alpha \beta$, and each of these has to be reckoned as a counter possibility to O. Still, if the probability of each is very low, that of O will exceed the combined probabilities of them all. In any case, O is more probable than any other single explanation. And we may say generally that if the component causes be equally probable, the simplest explanation which will explain the total effect is more probable than any explanation which is more complex; and the greater the complexity of the alternative explanations, the more probable

¹ A term which I derived from Professor Minto (*Logic*, bk. ii. chap. vii.). The difference between it and the method examined above is that it does not decisively eliminate rival possibilities, but rests on the theory of chance.

² How much less frequent we cannot say precisely. We must not assume that M will coincide with P as often as not. There is no reason assigned why M should coincide with P more often than with any other fact, X, Y, or Z. Unless, then, P is itself very common, the number of combinations M P should be very small as compared with the occurrence of M. It is tempting but illegitimate to argue that given α the chance of M is one third, and given β the chance of P is one third, and that, accordingly, given α and β the chance of M P is one ninth. This ignores the question whether there are independent probabilities affecting the combination of M and P. These probabilities, seeing that α and β may be caused in other ways, are found in the chance of M coinciding with P, a chance which must be measured by the frequencies of the two elements.

the simple explanation. We assume, of course, that no reason is known for taking one of the causes $MNO PQ$ to be more frequent than any other. So far as anything is known which leads us to treat O as intrinsically improbable, the argument must be proportionally modified. Lastly, we have so far assumed exhaustive knowledge of the list of causes of α and β . But this can only be arrived at with more or less of probability, in accordance with the argument of the preceding section. Except therefore as presupposing that argument our present considerations have no *locus standi*. It results then that when we have only a simple combination $\alpha\beta$, in which there are but two separable elements, the argument to a common cause will not be strong unless the experience bearing on the subject is of a very special kind. If, however, we take in fresh elements, if, that is, the complexity of the effect increases, the argument becomes stronger. If we have 4 elements $\alpha\beta\gamma\delta$, and even if, assuming that we know nothing whatever about their collocation, we take the chance of each at $\frac{1}{2}$, the probability of the whole collocation will be $(\frac{1}{2})^4 = \frac{1}{16}$. The actual probability, as based on observation, may be very much less. The probability of such a collocation of separate causes will be proportional.¹ Hence if one cause is known which will "explain" the whole, its probability as against a quadruple collocation is as $\frac{1}{2}$ to $\frac{1}{16}$, i.e. 8 to 1; while, if we suppose a possibility of a collocation of two causes explaining the 4 effects, this chance would be more probable than the quadruple collocation though less probable than the single cause. We thus get an explanation of the rule that the hypothesis is more probable in proportion as it is simple and as the facts it explains are complex. Of course, so far as we have definite information on the frequency of any of the alternative causes, our result will be so far modified.

(e) Lastly, additional characteristics, or the precise definition of the effect, may put certain causes out of court altogether. It may be that α is caused by M , and β by P , when MP would give $\alpha\beta$. But suppose M also gives γ , or P , δ , and that either γ or δ are absent in this instance, it is clear that the suggestion of MP must be rejected. Thus the comparatively simple, undefined, effect may have any one of a great number of causes, while further attention and analysis, or additional information,

¹ This will hold whether a $\beta\gamma$ and δ have each one cause only or many: for given their frequency, the frequency of their causes as a body is fixed. If α has a frequency of one-twentieth, so have all its causes taken together. If it has one cause, that cause has a frequency of one-twentieth. If two, each has, say, one-fortieth, and so on.

may so qualify it as to rule these causes one by one out of court. Another common result of more precise knowledge is to necessitate the suggestion of further complexities, each of which, without absolutely entailing the rejection of the hypothesis, makes it upon our principle more and more improbable.

All "circumstantial evidence" rests upon the foregoing suppositions. A man is found dead with his throat cut. A knife is found in a ditch close by. There are footprints in the mud. X was known to be in the neighbourhood on the day; evidence is given that he purchased the knife a week before; his boots fit the footprints. All these facts might be due to a collocation of separate causes, but all are explicable by a single cause, namely, that X planned and carried out the murder. The single assumption is so much more probable than the multiple combination of circumstances that it is likely to go hard with X, and his business is to produce some fact incompatible with the above explanation. Failing this, one or two more such combinations of circumstances and our conviction of the strength of the hypothetical argument will be evinced in a very practical manner.

We may sum up the whole argument in the positions, (a) that other things equal, the simplest collocation is more frequent than the more complex; and (b) that the only other thing that can be unequal is *de facto* observation of the frequency of a suggested cause. From these positions it follows that when the effects are many and separable, but all explicable by a single cause, that cause will be more probable than any combination of separate causes, in proportion to its own simplicity and their multiplicity; while, further, this probability is heightened or diminished according to the results given by observation as to the comparative frequency of the different causes compared.

It will be seen that our statement of the hypothetical argument justifies an earlier remark, that this method assumes pre-existing knowledge of causal relations. For until such relations be known for the single elements, however likely it be that $\alpha \beta \gamma \delta$ should have a single cause, that is no evidence whatever that any fact A is this cause. That A is such a cause can only be shown by ordinary induction for the whole complex $\alpha \beta \gamma \delta$, or for each part of it separately. In either case the foundation of the process is direct induction. On this ground alone the theory which identifies the hypothetical method with induction stands condemned. The truth is that this method is a complex result of the theory of probabilities

as applied to a subject-matter in which many simple inductions are already known with a view to explaining a complex case—whether an individual fact or a species—for which, from whatever cause, direct observation and elimination are impossible. It is hard to see how we could possibly imagine a cause which would “explain” an effect unless we already knew that that sort of cause explained that sort of effect, *i.e.* in cognate cases, or in cases composed at least in part of similar elements. Explanatory causes are not revealed by intuition, but learnt by experience. And only such causes as resemble those experienced can be used as explanatory of new effects. In fact, induction gives us probable inferences from cause to effect, and with less ease (since experiment is impossible and we rest on observation) from effect to cause. In complex cases of special interest we utilise this basis of knowledge to construct explanations to which the facts point as being more or less probably the explanations available. The “explanatory” method is thus not induction proper, but a special application of inductive results.

CHAPTER XVIII

CONSTRUCTIVE GENERALISATION

WE have seen in Chap. VI. that what appears at first sight as inference by construction is a genus containing two species. The first consists of syllogism, in which the premisses give conditions combined into a result. The second combines parts into a whole, or unites relations to form a resultant. These last appeared analogous to ordinary perceptual construction, but with this *prima facie* difference, that they were or could be stated as general truths. This form of construction appeared in fact as a generalisation from experience, and a generalisation of a peculiar type. Our business in the matter is twofold; first, to get at the generalisations involved, and secondly, to explain and justify them.

1. We have already (Chap. VI.) noticed some cases of this kind of inference. We may now distinguish its two main types and bring them provisionally under appropriate axioms.

(a) The first type is that of arithmetical addition or subtraction $3 + 5 = 8$, two pints one quart. In these cases we are given certain elements, and assert that these elements form a certain whole. Both the elements and the whole must be such as to be known *otherwise than in relation to each other*, or we get into tautology. Thus, if 8 only meant $5 + 3$ the statement $5 + 3 = 8$ would be an idle play on words. But 8 also means $4 + 4$, $10 - 2$, 4×2 , and I will venture to say that it also and primarily means 8. That is, it is a name for a certain whole qualified to our apprehension, or to our construction of apprehensions in a definite way, which distinguishes it from all other wholes, and is in fact the basis of all the analyses and relations mentioned above.¹ But if 8 does not merely mean

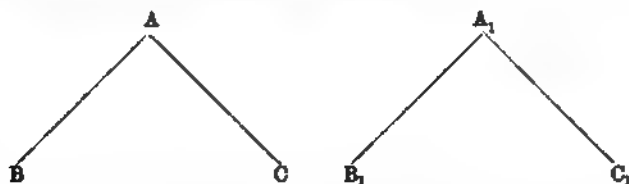
¹ The qualitative character of a number is well illustrated by the case of children and primitive men, who can discriminate numerically different wholes which they cannot count. This means that the unanalysed qualitative character of the wholes is different for them, whence each totality must be recognised by its character as a totality. This is how a savage who cannot count much beyond ten can tell whether any cattle in a herd of 400 or 500 are missing (Cantor, *Gesch. der Mathematik*, Introd. p. 4).

5 + 3 over again, what is the nature and validity of the judgment? In the first place, it is a generalisation, being stated not of this or that 5+3, but of 5+3 as such. Secondly, it may be taken as resting on observation; for since we know observation to be a basis for generalisation, and since we know the relation in question to be observable, we have no right to assume the contrary, seeing that the simpler hypothesis which rests all generalisation on a single basis is *prima facie* capable of explaining the facts. But it has often been urged that there is this peculiarity in generalisations of this kind, that they become obvious upon the first observation. Well, assume it to be so. What then will be the axiom involved? This, that if certain facts taken together constitute a certain whole, precisely similar facts will together constitute a precisely similar whole. 5 and 3, to whatever objects applied, are in themselves precisely similar. So is 8. The generalisation in question, therefore, follows immediately from the axiom.

The axiom, it must be explained, must be taken very strictly or it will give false results. That is to say, the facts first taken must by themselves, and of themselves, truly build up or form the whole. The whole must consist of the parts, neither more nor less. The formation of the ideas of such a whole and parts may involve a high degree of abstraction, which is indeed the case with all additions of pure numbers, and it is only when the abstraction is completely and consistently carried out that the result is true. Two bodies of ten men each are equal to one of twenty in point of number, but one blast of Roderick's bugle-horn were worth a thousand men. That is, to avoid error we must know precisely what we sum, and we must know precisely what our whole is. The whole must not even be a physical or psychological effect of the elements, for the effect in this case will mean an affection of something else, and that affection may be partly due to some further circumstance. Thus it would at first seem fair to generalise an æsthetic effect. If two colours make a horrible combination, surely that combination is simply the total of the two in the relation of juxtaposition? Not necessarily, for neighbouring colours, intensity of light, and so on, may contribute to our view of the total, which is in reality a reaction of feeling on the stimulus here produced by the colours. We must restrict ourselves, then, to the mere summation of parts if we are to get a true whole which is determined by, and itself determines, the parts. On the other hand, we may or may not take account of the relations of the parts, and according to our attitude adopted on this point the character of our construction, and

therefore of our whole, will be materially modified. In pure counting we take no account of the relation of the units, except such relationship as is involved in their all belonging to some kind of unity natural or arbitrary. On the other hand, in analysing any geometrical figure our attention to the relations involved must keep pace step by step with the analysis of parts. Two right-angled isosceles triangles form a square, but only in one special relation, namely, where they have the hypotenuse common. Our axiom, then, states that the relation of whole to parts is uniform, and that we may accordingly generalise any single case of such a relation, provided that our analytic observation has determined accurately that the given whole is formed of the given parts, that the relations of the parts do or do not enter into the composition of the whole, and that it is understood that the relation of whole to parts is one detected in the given¹ by analytic attention itself, and is not any effect beyond the given elements. But these conditions are to be secured by adequate abstraction, i.e. by perfected analysis, and accordingly it is on that perfection of analysis, which enables various elements of the given to be considered apart from their context, that the sciences of pure quantity depend.

(b) A second class of constructive generalisations are distinguished by dealing with a nexus of relations. We have already, in Chapter VI., given instances of these, and we have only here to suggest an axiom which, without being inclusive of all the cases in point (as we shall see presently), will sufficiently exemplify the mode of reducing such inferences to rule. Amplifying the diagram of Chapter VI.,



we are given three points $A B C$, such that B and C both stand to A in a definite observable relation, and if the relation $B C$ be observed, then this relation may be regarded as the resultant of the other two, and may be generalised so that if we have B_1 and C_1 (precisely similar terms to B and C) stand-

¹ By "the given" it will be recollected that I intend not only the content of any single act of apprehension, but also a content formed by construction of such contents. Within either content analysis may directly observe the relation of whole and parts.

ing in relations to A_1 precisely similar to those occupied respectively by B and C to A , the resultant relation $B_1 C_1$ will be precisely similar to the resultant $B C$. Here, as we before pointed out, the resultant is not a simple construction of $A B C$. That construction, the true whole formed by the arithmetic summation of the data, is accurately represented in the diagram by the complete line $B A C$. In fact, the line or relation $B C$ is a relation discovered by analysis in the whole $B A C$ formed by the given elements. Thus before, we had an inference from parts to whole; here we go a step further and infer to the new feature contained in the whole as constituted by the given parts. Of this type are all generalisations of that rudimentary but often necessary kind of geometrical reasoning which infers from a plan. So at bottom are all generalisations about degree and proportion. That degrees form a scale we learn, I take it, by observation; and by the same observation we learn the meaning of intermediate steps. At the same time we rigidly generalise every fact observed. Thus, that 6 feet being more than 5 feet is also more than 4 is not a purely independent generalisation, but having once apprehended the relations of greater, middle and less, together with the resultant relation of the extremes, we apply this knowledge as a generalisation to all quantities similar in the points compared, i.e. similar in admitting of direct quantitative comparison and of presenting the above character of graduation. That being granted, the relation of 6, 5 and 4 being observed, its resultant is a deduction from the major premises laying down the character of such degrees. Every method of relating contents to one another by comparing them with an intermediary thus learnt once is learnt once for all. Wherever such a relationship is ultimate, i.e. does not rest on calculation by the putting together of still simpler relations, its basis is immediate generalisation from an observed case.¹

¹ M. Georges Mouret (in a discussion suggested by an article of the present writer, *Mind*, Jan. 1892) draws a useful distinction between a "resultant relation," which is in effect a mere definition, and one which states a law. Thus defining equality of forces, as he does (see his article "Sur l'Égalité Mathématique," *Revue Philosophique*, vol. xxiii, esp. pp. 136 ff.), in terms of equilibrium with a third base, he is quite right in saying that to conclude from the equilibrium $A = B$ and $B = C$ to the equality $A = C$ is not to express a new fact, . . . but to repeat a definition." I agree. This is my case explained above (Chap. VI), when we construct a whole, but without inferring any further resultant relation between any of its parts other than is involved in their coming to form a whole. Equality (if we take M. Mouret's definition) is not inferred from the double equilibrium, but is the fact of this double equilibrium. Here, then, our axiom of construction does not apply. Other cases, says M. Mouret (*Mind*, loc. cit. p. 103.), are those of true "laws" of coexistence, and are based on

2. We will not at this point attempt to exhaust the axioms of that character which are tacitly employed in the various parts of mathematics and other sciences. We shall have to return to the subject later in the chapter, and meanwhile the two axioms taken will sufficiently exemplify the class. Our problem now will present itself thus. Granting the existence and truth of axioms of this class, the immediate necessity of mathematical and other truths explains itself. For these axioms are such as to give a certain generalisation on being applied to a single observed case. If then they are taken for granted, the primary truths of mathematics fall into a derivative place as generalisations from a single instance by means of these axioms which in themselves are essentially principles of generalisation. If this is so, then the grand problem of the affinity between mathematical and other reasoning resolves itself into the question, How are these axioms connected with the general principles of reasoning? Starting from the inductive principles which we have assumed all along, can we connect them with our axioms of construction in such a way that the latter follow from them either directly or by their

induction. This is also possible. But there is a third and important class of cases where a resultant relation is asserted as coming about when certain elements are combined, which relation is not a mere expression for the fact that the elements are combined, but is nevertheless generalised with confidence, as it would appear, from a single case. My axiom is intended to cover these instances.

One further point must be mentioned. I have tried to make clear that two relations can only be so constructed as to form a third on the basis of an observed case in which they do so form it. You cannot (except perhaps in a few cases to be explained lower down) construct relations without direct empirical knowledge of the whole that they form. Hence I do not think M. Muret's axiom of symmetry (*Revue Philosophique*, vol. xxxii. p. 286, etc.) applicable except on the basis of experience (see Mr. F. C. Russell's criticism, *Monist*, April 1894, p. 462). You cannot say generally that if there are relations of like kind between A and B and B and C, that there will be a similar relation between A and C. You can only say so when experience shows it you in a given case. If you find A-B, B-C actually giving you the relation A-C, then you can generalise it. If not, not. You cannot even say that if A and C are both related to B they must be in some definite relation to one another—other than that in which they already stand as being thought of together (see Bradley, *Logic*, bk. ii. pt. i. chap. ii.—“A runs faster than B, and B keeps a dog”—what relation is there between A and the dog?). Hence my axiom is modelled on that originally suggested by George Eliot—“Things that have a constant relation to the same thing have a constant relation to each other,” and not on Mr. Herbert Spencer's amendment of the same (*Principles of Psychology*, pp. 107, 108, note). My argument, in fact, does nothing but define and apply George Eliot's axiom.

Any such axiom is of course merely implicit in ordinary thought. Mr. Bradley is fully justified in denying the use of an explicit major in construction. But it remains that an observed parallel is the ultimate logical basis of the construction before us, and that in making constructions analogous to such as we have found we commit ourselves to a general principle.

application to experience? In either case the guarantee of mathematical truth will be in the last resort the same as that of all truth whatever.

The obvious way to explain these axioms—the intuitionist way is no attempt at explanation, but a mere reiteration of the fact of subjective certainty—is to treat them with Mill as generalisations from experience. But in carrying out this idea, Mill made an unfortunate “strategical” blunder. Having suggested that necessity is hypothetical in character, a suggestion on which all fruitful thought has subsequently proceeded, he unfortunately deserted this point of view and endeavoured to explain it as a kind of psychological fiction arising from multiplicity of observations. Against this, thinkers like Professor James retort with crushing effect, that if you take simple observations *as they stand* they are far from giving you the multiplicity of instances required. Two and two do not always make four in the physical world, *e.g.*, in one of Professor James instances, add two drops to two drops *physically*, and the whole makes one large drop. Two straight lines do seem to enclose a space. Apparent circles have unequal radii; and if *πλέον ἡμῶν πάντος* is obvious metaphor, it is at least doubtful whether direct physical experience would make us confident that the straight line is the shortest possible between any two points. The rejoinder of the sensationalist to these objections is, that you do not in mathematics mean the same thing by straight, equal, circular as you do in the crude observations of daily life. But this answer is fatal to sensationalism, because it admits that the truths in question are due, not to the accumulation or interaction of the observed facts as they are in their concreteness, but to the abstractions and universal relations of abstractions which are picked out of the concrete by construction and analysis. The truth is, that the bricks of which mathematics are built are not sensations or facts of apprehension in their concrete form, but certain elements in these facts detected and fastened on to by analytic attention.

Along with this goes one other of Mill's points, the effect of multitudinous experience. The many experiences are not there, and if they were they would not give the logical certainty required. Clearly, if we are to explain the axioms as generalised from experience at all, by far our best move is to play the scientific method. And no one could deny that the axioms regarded as generalizations conform quite strictly to the scientific canons of difference and agreement. Things equal to the same thing are equal to one another in *omnimoda*

materia (agreement); and if you disturb the equality of either to the intermediate, you disturb its relation to the other extreme (difference).

But though the inductive view cannot be disproved, inasmuch as axioms, being good generalisations, will obviously pass all the tests of sound inductive results, there are reasons in the general character of these truths which incline us to look elsewhere for their real explanation. There is a neatness and unconditionalness about our mathematical reasoning, and above all a finality in its certainty, which we cannot help contrasting with the lingeringly hypothetical character of induction, which always seems to keep an eye open to the odd chance of error. I propose, therefore, to substitute a different explanation, which is I think more complete and certainly to my own mind more convincing.

Granting their immediacy and necessity, both the axioms mentioned, and others of the same kind, may be explained as following directly from the axioms of induction together with a postulate of the judgment. All judgments, whether resting on explicit inference or not, wish to assert truth, and the method by which a judgment is formed should therefore be a sound method, *i.e.* a method by which, granting its premisses true, only true results can be obtained. Hence, however we analyse such a method, whether it resolves itself into any form of inference or exhibits any other general principle whatever, that principle must be a true one. This may be said to be a postulate of the judgment, *i.e.* by forming and adhering to a judgment we postulate the validity of the method by which we have formed it. The truth of our judgment, again, stands or falls with the validity of its method; and if, finally, there is some particular method upon which all judgments rest, upon which judgment as such rests, the validity of that method is implied by every judgment which we make, *i.e.* by the whole body and structure of our knowledge.

Now, judgment, we have seen, involves construction and analysis. It puts different apprehended contents together; it fuses apprehended with remembered contents; it combines contents originally given in separation and capable of being recalled separately in memory. Similarly, it directs its attention analytically, now to one part of a given content, now to another, now to a relation, now to an attribute. Confining our attention to the points that immediately concern us, it thus asserts (*i.e.*) wholes of which the elements are or have been given. The simple judgment "It lasted two hours" involves the summing up of the content of a very long continued apprehension,

or of distinct and successive acts of apprehensions in a single assertion. The whole has never been given as a whole to apprehension, though its parts have been all apprehended whether continuously or in succession. But the judgment takes the parts and forms them into a whole, i.e. it makes the parts a basis for the assertion of the whole. And in this the axiom "Same parts same whole" is implied. If, as a fact, the whole was not entirely determined by its parts, a judgment which asserted a whole immediately on the basis of its parts and without any further consideration would be liable to error. Accordingly, the very existence of the constructive judgment postulates the relation of whole to parts according to which they mutually determine one another.

And (ii.) the judgment asserts relations which have not been given, between terms which have been given separately. "A is like B," when A is a present, B a remembered, content,—is a simple instance of this. The relation of likeness has never been given in the way in which the likeness of two i's or two e's is given to me on this page. Here again, then, we postulate that the relation is fixed by the terms. If, when the terms were once clear, the relation might yet vary, there would be no safety in any comparison that should go beyond simultaneously presented data.

Now, if we treat the relation as a fact discovered by analysis of a whole which in fact contains both terms and relation, we may go on to put the principle thus—that similar wholes can be analysed into similar elements. Just as before we saw that the constructive judgment implies that the parts determine the whole, so here we see that the relative judgment postulates no more than that the whole determines the parts. The relative judgment, in fact, first builds up a whole (two ideas, two remembered contents, or one idea and a present content, as the case may be) and breaks up this whole into the two terms and their relation. But that this shall be true, both our axioms of the determining of whole by parts and of relation by terms (or, if we now prefer it, of relation and terms by the whole which they constitute) must hold good. Our axioms, then, are postulates of judgment.

Observe the result. By the axioms of induction, what is true of A as such is true of it universally, or what can be affirmed of A without further consideration, without regard to any further fact, can be affirmed of it universally. The postulate of the judgment is that we can assert a whole on the basis of its parts, and the parts on the basis of their whole without considering any further fact: that is,

we can affirm the one term of the other as such, that is universally.

Now, in any case, let a relation of parts to whole be observed, whether by immediate apprehension or by the help of construction and analysis. It must follow that the given relation must be generalised. Hence every addition, every analysis of a whole into terms and their relation, once performed, holds good forever for those parts, for that whole. I do not seriously require to add up 2 and 2 and make them 4 in different contexts and under different conditions in order to assure myself that no casual concomitant interferes with the result. I do require to add them once, but that done I generalise the result by means of my knowledge of the nature of the relation before me. I no longer need to place 2 sets of 2 objects before my eyes, nor 2 ideal 2's before my mind. The symbol-figures 2 and 2 taken to stand for such ideals give me 4 by inference. All actual calculation, then, whether in pure or spatial quantity, going on, as it does, *without the necessity of repeated observation*, involves the application to fresh cases of generalisations originally derived from single observed cases. Give me two quantities to add. I may perform this by counting, i.e. actual construction of apprehensions of these numbers. Then my act is original and independent. Or I may bring these numbers, either directly and as wholes, or indirectly and part by part, under generalised constructions already made. In the more complex case, when I take part by part,¹ the synthesis of the parts is again a further application of yet another construction. These constructions and their applications in ever-growing complexity constitute the work of mathematics.

3. It was generally admitted by the defenders of the "inductive view" of mathematics that its inductions were few, simple, and easy, and that the main business of the science was to combine the general principles once obtained into fresh deductive results. And it might be thought that our present argument would go to confirm that view. But two limitations seem necessary. First, much so-called deduction in mathematics consists really of a repeated and special act of construction, which must be noted in some special case, whether on paper or in the mind's eye, and tacitly generalised for every case of the class. Thus, in Euclid, I. 5, we produce the two sides A B, A C in accordance with the postulate that any straight line can be indefinitely produced. We take the points D and E, such that $DB = CE$ in accord-

¹ As, e.g., in the addition of all double figures.

ance with a previous problem. But that, by joining C D and B E, we shall get two triangles, that these triangles will have the angle A common, and that their sides A B, A E, A C, A D will be made up of the two equal sides of the original triangle and the equal added lines B D, C E, could surely be clear only by a special analytic or constructive act. I must "see" that it is so, by either physically or mentally making it so; and I must be clear, further, that this result depends on no special feature in the triangle A B C, but merely on the fact that it is a triangle and has equal sides. Every such construction seems an original and independent mental process, not to be identified with the application of a general truth already known to a fresh case. And so geometry will appear as not a mere set of deductions from a few principles, but equally as a network of constructions without which these principles could not be applied to such a complex variety of data.



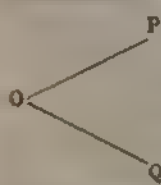
Now, secondly, these and even simpler constructive generalisations are not without difficulties of their own—were it otherwise, mathematics would be all plain sailing to every dullard. They involve a certain combination of construction with analysis which may be by no means easy to carry out with success. When a construction merely combines certain apprehended contents as they are given, there is scarcely room for error as to the whole formed by them. The case is the same where analysis breaks up a given whole into parts. Now, the generalisation in these cases holds simply for contents precisely similar in every point to those originally taken. But in the ordinary constructive generalisation, a good deal of diversity is allowed, and is held to be immaterial. Thus arithmetical generalisations fasten on the mere quantity of objects, and claim to take that aspect of things and generalise its relations on its own account. Here each quantity at least is definite; but in algebra we go a stage further in abstraction, and form calculations regarding quantities as such. So, again, the generalisation, that if equals are added to equals the wholes are equal, may be founded on perception; but any perception of equality must involve concrete quantities of concrete things of which the equality is only one aspect.

In all these cases analysis marks out for itself certain aspects of the given; and it is, again, analysis of the given total which determines what those given parts amount to when summed. In $6+4=10$ each term is (relatively to any given facts, small concrete objects or strokes of a pen) an abstraction

obtained by analysis. This is equally true of the whole 10 and of the parts 6 and 4. Now, the judgment says that the one side of the equation is a construction of the elements contained in the other, and accordingly it generalises this equation. Hence the truth of the equation depends on the correctness of the analysis. And this correctness involves that in the summation those ideas referred to in the judgment, and only those ideas, are before the mind. If any other part of the given content creeps into the formation of the whole, the generalisation will be wrecked. The same result will happen if one of the terms has in the given case a special character which is ignored in stating the generalisation. In that case the whole, in the form of it here given, may correspond to the parts, but not in its other forms, and we get the fallacy *a dicto secundum quid ad dictum simpliciter*. This fallacy, no doubt, more often attends the verbal expression, the proposition, than the judgment as an actual thought; but the proposition modifies the judgment, and transfers its fallacy from the spoken to the thought content.

4. The difficulties of construction based on abstraction give a certain place in the formulation of axioms to a regular eliminative induction, though rather, perhaps, by way of verification than as the sole and sufficient foundation of the axiom. Is it doubted whether a given combination of ideas is correctly formed? Then the fallacy may be in the subreption of part of the concrete setting of the ideas. In that case try the same idea in a different context—just as in the method of agreement. Again, was it a special form of idea A which broke up into the parts B-C? If so, a different form of A will not reveal such an analysis.

The old axiom famous in controversy, that "Two straight lines cannot enclose a space," appears to me a generalisation of this kind. If I take any two drawn lines O P and O Q—



they clearly meet in one point only and then diverge, and any other pair of lines, O' P' Q', precisely similar to these, will not only diverge but will diverge at the same angle and at the same rate, i.e. imaginary base lines P Q, P' Q' drawn at the same distance along each line from O and O' respectively would be of the same length. But that two straight lines cannot enclose a space is a proposition of a more abstract character. It involves the analysis of a given content such as that drawn above, and implies that we select the more general contents, one straight line, another straight line, and (relation between

them) divergence from a common point.¹ This analysis takes us into the region of ideas, and *if we can so fix these ideal contents as to be able to form in our minds a construction of them with the definite relation resulting*, then we can have true abstract construction, and can generalise accordingly. Hence it is true to urge against the sensationalist theory that mathematical (and other) constructive generalisations are not, or at least are not always, made directly from sense-perceptions. But seeing that the ideas used are themselves derived from sense, the constructions of them are mediately so derived also. Nor have the ideas or our constructions of them any validity unless they will stand the test of application to sense. But the ideas are intermediaries, and intermediaries which do not merely pass on results, but which form the basis for further constructive and analytic action. Hence it is true that in abstract constructions ideas form our immediate data, and hence, also, certainty of application may be increased by a true inductive (i.e. eliminative) verification.² We conclude that the concrete wholes of apprehended contents may be generalised immediately, while, as to abstract constructions, two processes may be employed. In many cases construction may depend purely on perceptive analysis. Just as (according to our contention) we perceive the abstract attributes of things, so we perceive directly the summation and division of such attributes. That 7 is composed of $4 + 3$ is then just as direct a perception as that of 7, 4 and 3 themselves. Attention is concentrated on the purely quantitative aspect in the mere judgment "There are seven," and in the equation $7 = 4 + 3$ it is similarly directed to the specification of the parts of that aspect. Then the analysis once performed holds good universally. But in other cases that analysis may be helped out by a true eliminative induction. The starting-point in this induction is that the elements of the construction must be within the given concrete whole. But the doubt is whether some other elements of this whole have not crept into that construction which we have taken to depend on such and such elements, and on them only. Thus in combining two conceptions I

¹ This by itself would give us the axiom that two straight lines can meet in one point only. The case of parallels has to be included before we make the wider generalisation. Does not the rejection of these and Euclid's twelfth axiom, as neither self-evident nor deducible from any other axiom, rather ignore the possibilities of inductive proof?

² Ideas, it will be remembered, have contents drawn from given reality, and bear reference to that reality. An "ideal experiment," then, a construction of ideal elements, is logically a construction of real elements, and to generalise such a construction is ultimately to draw an inference from the behaviour of given wholes.

may be unconsciously influenced by the "image," the concrete setting in which the conceptions are present to me. If, then, by applying my conceptions to varying matter, I eliminate all the elements discovered in the concrete given whole except those of which my construction takes account, I remove this doubt. And observe that induction of this kind is for its purpose final, since it has merely a definite, given number of possibly interfering concomitants to reject. Such induction, then, may in many cases help out perceptive analysis.

It may be added that an axiom resting on this kind of induction may have two possible meanings. If we have examined A_a, A_b, A_c , and found them all to be B , and thence generalise $A B$, we may mean by A only cases exactly similar to those examined. Then $A B$ is a summary of generalisations each perfectly certain. But A may be such as to admit of further species A_d, A_e , unknown to us; and if we intend our axiom to include such possible cases, it will be safe only so far as the analytic elimination in the instances given has been complete, i.e. as B is known by them to be constituted by A and A alone. There is an element of ambiguity and uncertainty here which should not be overlooked in the use of axioms.¹

¹ From the theory of the text we should naturally infer that mathematics in their primitive stages would have a *quasi-inductive* character. That is to say, that 1) they would tend to deal with concrete objects, or classes of such objects; that 2) their results would have the aspect of independent generalisations, rules of thumb, and so on; and that 3) they would be encumbered with difficulties in rising from these first generalisations to higher, more comprehensive, and more abstract principles. All these points seem to be borne out by the little that is known, or probably inferred, as to the early history of arithmetic and geometry. As to 1), the familiar facts of counting by fingers, or other concrete objects, is a sufficient illustration (see Tylor, *Primitive Culture*, vol. i. chap. vii.). The relation of geometry to land surveying is equally familiar (Cantor, p. 53, who refers to Herodotus, ii. 109, etc.). Traces of (2) appear, even in arithmetic where one would be least sanguine of finding them, in the papyrus of Ahmes, a book of arithmetical rules of the time of the Hyksos. "The first part" of this treatise "deals with the reduction of fractions of the type $2/(2n+1)$ to a sum of fractions whose numerators are each unity" (Ball, *Short History of Mathematics*, p. 41). With this object, Ahmes gives a number of rules dealing with quite singular problems, but without reducing them to any simple rule (Cantor, op. cit. p. 21). The solitary exception is the rule for finding the value of $1/3$ of another fraction, but even here the list of instances given presents exceptions which lead Cantor to conclude that the only possible explanation of the tables is a gradual origin with no comprehensive unity of thought (p. 27). In geometry we have fuller evidence, though the comparative absence of information as to the proofs used by early geometers must make us careful in resting much upon it. Three things, however, seem clear. The Egyptian geometers worked on concrete problems mainly with numerical data (Ball, p. 4; Cantor, p. 56). The turning-point in geometry came when Thales and the early Pythagoreans began to generalise their results. And this "generalisation" proceeded only piecemeal

5. So far for our general theory. We have only now to remind ourselves that we have carried it on by the help of two axioms for which we did not claim a comprehensive character, but which we took as illustrative. From these axioms many seemingly axiomatic truths may doubtless be derived, but some I think are better explained as directly due to the postulate which we have seen reason to place at the basis of the whole matter. One illustration of this will be sufficient, and I will take the famous axiom of measure (things equal to the same thing are equal to each other) for the purpose.

It is a postulate of the judgment that likeness (like other relations) depends on the terms related. Between A_1 and A_2 I observe perfect likeness. That relation, then, is due to nothing but the directly observed character of the two terms themselves. I have now A_2 , which I cannot compare directly with A_1 , but which is given exactly like A_2 . Whatever follows from the character of A_2 follows accordingly from that of A_1 . But A_2 and A_1 exhibited precise resemblance, therefore A_2 and A_1 must have the same precise resemblance. Equality is simply a case of precise resemblance in the particular point of quantity. Whence the axiom, which is in fact a particular

and by slow degrees. It seems clear that Euclid, i. 32, was first proved for separate classes of triangles, and then generalised for triangles as such. (This important point rests on a statement of Geminus given by Cantor, p. 120; and we may add, that it is borne out by the constant choice of this property by Aristotle as illustrating the true method of *ἀναγωγή*. *See infra* 1. 10 is not true *ad alios* of isosceles triangle, but of triangle as such, *Post. Anal.* i. 4, p. 73, b. 23 ff. etc.) There are probable indications that Pythagoras (1) arrived at Euclid, i. 47, first of all in the particular case where the sides are to one another as 3, 4, and 5. And Cantor shows that the attempt to generalise the equation for other numerical values would at once lead (in the case of equal sides) to the problem of the incommensurable which the early Pythagoreans were the first to introduce pp. 153-156, for a hypothetical reconstruction of further stages in the general proof of i. 47, see p. 157, and Allman, *History of Geometry from Thales to Euclid*, p. 23-38). That the mathematicians of his day were actually learning to "take the particular as a mere instance of the universal" is the historical explanation of Plato's account of *ἡμεῖς* (*Rep.* vi. 511), which is precisely an instance on the point that mathematical truth is universal and should be taken as such. As to (3), much of *Algebra* geometry is of the rough and approximate character which we expect in results generalised from observation (Cantor, p. 48 ff.). A singularly prevalent instance of a bad generalisation is the idea that area is proportional to circumference. (Cantor, p. 146, gives numerous instances of the fallacy from Thucydides (vi. 1) downwards.) This seems a simple instance of the error made by every schoolboy who "proves" his "rules" by finding some property common to two or three figures which he draws as types. Lastly, Aristotle's rule for discovering the *ad alios* (*Post. Anal.* i. 5) may be taken as a formal statement of this kind of eliminative induction, i.e. which starts from a definite whole within which the ground of a quality must lie, and, by comparison, abstracts and so eliminates the elements unessential to the quality.

case of the more general truth, "contents precisely similar to the same content are precisely similar to one another."¹

I conclude from these examples, that the ordinary axioms at the basis of our deductions are to be explained as generalisations from observed fact on the ground of the axioms of induction in conjunction with a postulate of the judgment. The principles resulting from this conjunction make it possible to generalise rigidly from a single observed instance. Such an observed instance may be the immediate basis of generalisation, or the analysis and construction may be primarily applied to ideal contents, but here also the reference is ultimately to the apprehended fact, and the ideas and constructions are false unless verified in apprehension. In every case, if the construction as an abstract fact is to hold true of the abstract elements, the correspondence in the observed case must have been given by analysis as holding between the two sides in their abstract character. Of this, comparison of instances is a good subsidiary test. But it results naturally (and in accordance with common knowledge), that not a wide purview of reality nor even a close attention to details of the concrete, but clearness of thinking, that is, the constant adherence to identical contents and constant distinction of such as are different, is the form of mental activity demanded of the mathematician.

6. The results now reached remind us of an old question. In Chapter VI. we held that construction and analysis of the present kind were *prima facie* inferences, and inferences of a different type from either generalisation or syllogism. At the same time, we objected to regarding construction or analysis as being in themselves identical with inference. We must pause here to ask whether that position has been maintained.

It seems clear from what we have said that any construction which is sound would admit of being generalised if it were worth anybody's while to generalise it. So far there is no distinction between one sort of construction and another. But if a distinction is wanted, it might be suggested that the constructions of this chapter must all be given in perception and memory before being asserted—that we could not "make" them by merely unting ideas. Well, this may be so, as a

¹ We have therefore here a case where the "axiom of symmetry" may be applied (see above, p. 428, note), but only because it follows from the same postulate as other axioms of construction. The so-called "axiom" is, in fact, hardly self-evident, but a deduction from this postulate,—and does not hold exception that basis.

matter of psychological capacity on our part, but I do not see how it can be proved,—and for logic, at least, it must, even if true, be a mere accident. For our view has been that a construction can be generalised just because it is the sort of result reached by a judgment. The judgment, in our view, assumes, as dealing with its ideal contents, certain relations of whole and parts as universal and necessary. And if we use this postulate to explain axioms of construction and analysis, it is clear that we are committed to the view that these constructions and analyses do not differ in logical principle from that which the judgment makes for itself working upon ideal contents. It must result that, in any case where we have the requisite ideas, we can combine or analyse them, and assert our result of the reality to which the ideas refer without observation of that reality or of a parallel construction.

Then, does one construction differ logically from another? Clearly no. Any construction may be generalised; no construction need be: any construction may, so far as logic is concerned, be made for an unobserved case without being generalised from an observed instance. Then, why is one construction inference and not another? We reply, any constructive result becomes inference if it is not made but inferred. If by construction I form $A + B$ into C , that is construction, and is not inference. If, without making the construction, I deduce it from the parallel $\alpha + \delta = \gamma$ (and this is what I *always* do when I use symbols or apply axioms), then I infer. If, making or finding it in one instance, I generalise it, as I do when I state an axiom, then I again infer, because I assert the result of reality at large without finding or making it in any case but this. I call this inference, in strict accordance with our definition, because it is an assertion treating one content as the condition or universal ground of another. When a construction is merely made or found, the result is not yet known to depend on the elements as conditions. Its dependence is discovered by the act of construction. Hence the made construction or analysis must go before inference as its premiss. Then its result can be used by inference, formed into a generalisation and applied to other cases.

The case stands thus. Inference is the *usage* of one content as the ground on which another may be asserted. This implies that the one is already known or presumed to be the ground of the other. In deduction—syllogism—this implication is stated in the major. In induction—when the particular is the ground and the universal the consequent—it is stated by the principle of induction. The relation of ground

and consequent is taken for granted by the inference as such, —implicitly if the inference is implicit, explicitly if it is explicit. Now the formed or given construction supplies the relation of ground and consequent. It does not therefore infer, but precedes inference. Conversely, this relation once known can be generalized like any other, and then as a generalisation becomes basis for true inference. Constructions and analyses can now be inferred without being made. And on this, in fact, mathematics depends. For in all the more complicated cases perfection of analysis or construction necessarily fails us. Who by direct constructive perception could ever tell that the square on the hypotenuse = the sum of the squares on the sides? Supposing you measure it for a given triangle, how do you show that you have *only* taken the properties of a right-angled triangle as such into account? You can do this roughly by the kind of constructive induction which we have described, and so in fact geometry begins. You can do it more perfectly and systematically by the help of a number of simple generalisations which you know will hold not only in the figure you draw, but in any figure. Hence the dependence of mathematics on axioms.

I conclude, then, that constructions, when generalised and applied, become inferences; but that any construction made in a given concrete case is not as such an inference. The syllogistic construction is an exception, because it is itself a process of treating one content as condition of another. But taking inference as presupposing the relation of ground and consequent, the perceptions which give this ground cannot use it as a ground.

We have now in outline reviewed the forms of inference under the three heads of syllogism, generalisation, and constructive generalisation. Of the first, we have seen that it involves no principle and no activity other than those already operative in the judgment, but that it implies certain premisses formed otherwise than by mere judgment. Of the second, we have seen that in all its varied forms it rests ultimately on a single connected system of principles which we have called the axioms of induction, and that, as it fulfils the requirements of these axioms, so it attains to truth and certainty. Of the third, we now see that it rests on the same axioms of induction together with a postulate involved in the nature of those judgments on which all reasoning depends for its premisses. The truth or validity of knowledge, as we possess it, depends accordingly on the validity (1) of the form of

judgment, or rather of the process by which judgments are made; and (2) of the axioms of induction. Postulating these truths, the fabric of our science is unassailable. We shall have to inquire later what reason, if any, can be assigned for postulating them.

CHAPTER XIX

EXPLANATION

WE have already dealt, not merely with the formation of universal judgments, but with their systematic connection. But in discussing the nexus of general truths our principal aim was to show the increase of certainty derived from mutual support. We have now to discuss more carefully the nature of the connections instituted by reflection on, and comparison of, generalisations, in order to see how far we may be said not merely (as Lotze puts it) to calculate the course of the universe but also to explain it.

1. The particular fact, indeed, may be in a way considered as already explained when we have referred it to an universal condition. Why is B here? Because there is A; and A always produces B. It remains, however, to explain the law A - B itself. The question Why may be asked of the law just as well as of any particular of sense. For every fact there must, on our principles, be a ground. And an universal law is a fact just as much as an individual occurrence. Somewhere in the nature of things there must be a ground from which the existence of any given law follows as a consequence. The given law A - B must itself be a conclusion deducible from some other law.

Where are we to look for this second law required? Not, manifestly, in any of the spatial or temporal relations in which our A - B stands. For by the terms of the problem A is to cause B universally, that is, without regard to anything in the nature of their concomitants. Nor, for the same reason, can we look to the further antecedents of A itself. They are necessary to B in so far as they are postulated by A, but not conditions which, given A, explain its producing B; otherwise, again, A would not be the totality of B's conditions. In short, no particular fact can determine A - B. It remains, then, that we should find its ground in some other universal relation, as $\alpha - \beta$, and again not in the frequency of $\alpha - \beta$, or in the position in which

it occurs, but in its nature as a causal sequence. We explain our law of causal sequence, then, by exhibiting it as following logically from some other. This other, in its turn, no doubt will require "explanation"; but of this later. Let us first ask how one law can be made to follow from another. The obvious first step is to do to the law what we have already done to the particular, namely, subsume it under some more general law. Thus, I fall because the earth attracts all manner of bodies towards it, and terrestrial attraction is an instance of the same universal law which makes all bodies move or tend towards one another. But why do I fall through air when I swim in water? Because, as it is generally put, of modifications introduced into the general law by the operation of special circumstances. We shall have to discuss these "modifications" later, and to phrase the conception better if we can. Here we note only that in explanation it is not enough to subsume the specific under the general. We must also explain the specific difference—we must show how the special laws are differentiated from one another, as well as how each is an instance of a wider generalisation. The simplest schematic form of such explanation would be the analysis of a law $A - B$ into, say, $(m\ n) - (o\ p)$, where $m - o$, $n - p$ were already known as independent generalisations. Explanation, then, is arrived at by a process similar in its conditions to that by which we have already shown that inferences may be combined; the only difference being in the attitude of our mind, the relation of our knowledge to the subject. Where any one of the generalisations $m - o$, $n - p$, $A - B$ is not as yet certain, and is not taken as such, the object of the combination is to strengthen it. When, however, $A - B$ (for instance) is already taken as established, then its connection with $m - o$, $n - p$ is an explanation of that which we already know, but for which we require a further reason.

For laws connecting facts which admit of analysis the need and manner of explanation may be very simply exhibited as follows. We have the universal $A - B$. Now if A can be analysed we can take any part of it, as α , and ask, is $\alpha - B$ also universal? We can indeed go further and say $\alpha - B$ must be universal unless there is something which makes a difference. And since *ex hypothesi* A contains all the conditions of B , that something must be found in the remaining conditions β of A . Now there are two possibilities. Either α taken alone determines some portion (from zero upwards of B), while β taken alone is responsible for the rest. This is the simplest—generally known as the mechanical—case of composition of causes. Or the

separate effects a and b of α and β are not such as to form B by simple construction of $a + b$; and thus it must be the union of α with β which so modifies the action of both that jointly they produce B . But in either alternative our axiom demands a law. If α produces a and β b , this must be in accordance with a universal rule, and if the conjunction modifies the action of the components, this, again, must be in accordance with some universal principle of the effect of composition, whether of composition as such or of the composition of elements cognate to α and β . The introduction of the factor of composition is in effect parallel to that of a third element. It is as though instead of $\alpha \beta$ we had $\alpha \beta \gamma$, and had to determine the parts played by each of these three elements in the production of B ; while, further, any one of these elements might have an effect which would not separately form any part of the actual constitution of B , but would form only the requisite modification of the other two effects.

Returning to our original position: if we grant that every law of nature ought ultimately to be explicable, certain important consequences follow. It is clear, first, that no one sequence has *prima facie* any more claim to be exempt from the necessity of explanation than any other. Hence, when we have referred $A - B$ to $\alpha - \beta$ we shall require some further $a - b$ to give a reason for $\alpha - \beta$. And for any connected body of laws the same thing holds. Even supposing that we had resolved every complex law into simple sequences, we should still look out for some method of connecting these simpler laws with one another. Supposing we could not effect this, by so analysing them as to find more elementary sequences of their own factors, we should require to take their characteristic difference, and show how each difference of cause involved a corresponding alteration of effect.

Now if we are to connect any two laws together, it will be allowed that this must be effected by some kind of similarity. The natural way of conceiving such a partial similarity as is required is by taking it as resolvable into a case of identity (i.e. complete similarity in some point or other) and difference. But if it be objected that the point of identity cannot always be traced, we may allow, at least for the sake of argument, that none exists; but we shall still insist that if two relations m and n are to be brought into any kind of connection whatever by means of the axioms of reasoning, the difference between them must be some one of those definite differences which admit of comparison with other forms of difference. The difference, e.g., between m and n may be a , which is identical,

say, with the difference between o and p , and again is $\frac{1}{2}$ the difference $2a$ between p and q , or is related as a to a with the difference between q and r . Without raising the question here whether such definite differences must or must not be based on a point of identity, we need only insist that they involve a comparability between the terms, and not that kind of purely negative difference which we speak of as disparateness or incomparability. It follows, then, that the universal need of explanation postulates an ultimate comparability of all simple laws of nature, while composite or derivative laws must be comparable at least through their elements. Thus the disparateness which we find *prima facie* among many given contents yields under explanation to comparison and analysis. What is in itself disparate is brought into relations of similarity by analysis into elements.

From this principle follows a further corollary. If the laws connecting contents be all ultimately comparable, so also must be the contents which those laws unite. A law is or expresses a relation between terms, and there can be no likeness of relation without comparability of terms. This result must not be taken as abolishing the disparate from the nature of things. Two contents P and Q may be as they stand incomparable,¹ but they do not belong to wholly different worlds. Analysing P into mno , we find a relation between it and $R (= lmn)$ or $S (= \mu \nu \sigma)$. Treating R in the same way, we can correlate it with $T (= klm)$ and $U (= ikl)$. As between P and U there is no point of identity, but a graduated series of differences connects them. A similar series may connect U with Q . All we mean, then, is that the complete system of thought is ideally a single system in which determinate differences, each with its ascertained result, connect the most distant points. The comparability of existing facts, treated by Lotze as a kind of fortunate accident, seems rather to be deducible from the principles of reasoning.

Lastly, we have now a fresh method of testing suggested laws. Hitherto we have used the "nexus of inductions" mainly as a positive method of augmenting certainty. Starting from any induction, we have allowed it such and such a degree of probability on its own account, and have held it so much the better if we could connect it with any other law, certain or

¹ I suppose it must be admitted that any two contents, e.g. a whale, and the sentiment of nationality, can be compared as existing or as objects of thought. But all you can get out of the comparison is a bare negation, which amounts to this, that the two contents are not comparable to any purpose. And this is what we really mean by calling them incomparable or disparate.

probable, without, however, looking on it as necessary to do so. Now, however, we have seen that any new induction must find its place somewhere in the system of general truths. Though it may not yet be explained, it must at least be explicable, and if its character is such as can be shown either on general or special grounds to render it inexplicable we have reason for rejecting it.

This principle of rejection must no doubt be applied with caution. We may have good or bad reasons for regarding a thing as inexplicable, and if our reasons are bad, our rejection of it will be ill-founded. But this caution, though experience may have taught us its utility in this instance, applies equally to every other application of logical principles, and does not go to show that the ground of rejection before us is as such invalid.

So far our result is that explanation is no mere intellectual luxury, but is demanded by the axioms of reason. That is to say, reason postulates a comprehensive system of universal laws interconnected by further laws of uniformity in the nature of the various established causal sequences, while it demands, further, that any suggested law should find a place within this system.

2. We have now to inquire a little more minutely how this systematisation of laws is carried out in that particular way which we call explanation, and with the peculiar mental satisfaction that results therefrom. That is, our question now must be, what precisely is explanation? When is a fact explained?

A particular fact is generally "explained" by being referred to its cause. If the rumbling I heard in the morning is put down to "guns practising at Plymouth," or "blasting rocks on the Cornish moors," this particular sound is explained as the result of that particular operation. That is, an antecedent is assigned for it already known as adequate to its production. If, again, I ask how it is that guns can be heard at this distance, a certain explanation is offered when it is remarked that the wind is in the south-east. In the first case, an antecedent not before known was assigned; in the second, the antecedent, or some of the circumstances attending its action, were further qualified by a point till then unobserved. On the other hand, to take a given sequence and state it in general terms is not to explain it, though it may be a prerequisite of explanation. When I further ask, how can you hear the guns with the most favourable wind possible? and am simply told that you always do, I may take it as a fact but not as explained. No further qualification of the contents is given

which would make their sequence intelligible. It is thus in the assignment of the antecedent as a whole or in some of its qualities that explanation lies. For the particular the antecedent has still to be discovered, and when this is done its existence here and now is explained. A given sequence, on the other hand, is not explained merely by being universalised, but in some way by analysing its qualities further.¹

Our success in doing this depends, of course, on the nature of the case, but the general type of explanation can be pretty clearly laid down. Supposing that we have a sequence $A - H$, and that we can analyse A and H respectively into elements $B\ C\ D$, $E\ F\ G$; and supposing, further, that the elements $B - E$, $C - F$, $D - G$ are already known and stand in universal relation to one another, we have then succeeded in so analysing the cause as to answer Hume's question and decide what it is in it which produces the effect. We have

$$A \left\{ \begin{array}{l} B - E \\ C - F \\ D - G \end{array} \right\} H$$

Then A as B produces the element E of H ; as C it produces F , as $D\ G$. The combination of the three elements gives the total relation. The derivative law is then explained by being exhibited as a construction of elementary laws. The analysis of the cause and effect corresponds here to the further qualification of them referred to before. Explanation is by the nature of the content.

Explanation is thus most obviously and appropriately applied to the sequences of *compound* facts; but much the same process may be applied without reducing the given to qualitatively simpler laws. Suppose we have $A - B$ to be explained, while $a - b$ is a law already known. Let it also be discovered that $\alpha - \beta$ is universal. Now let A differ from a by the definite qualitative or quantitative difference α , and B from b by β . Then A is for the purposes of causation related to a and α as it was before by direct construction to $B\ C\ D$. We have

$$A \left\{ \begin{array}{l} a - b \\ \alpha - \beta \end{array} \right\} B$$

¹ Mere generalisation, i.e. the statement that this sequence holds universally, may, however, be a prerequisite of explanation, as is well argued by Mr. Bradley (*Logic*, iii. 2, § 8). To say that this bottle breaks in the heat of the fire because all bottles do so is not "bare tautology." "For the particular nature of our one bottle is in this way connected with a general law. It does not break because it is a black bottle, or a quart bottle, or a bottle made by an infidel and on a Sunday, but because it possesses an unstated quality common to other bottles." Conversely, to demand a special explanation when a true universal is at hand under which the case falls is a fallacy, and not an uncommon one.

which equally explains $A - B$ by resolving it into sequences already known. Thus let A be a suggestion to a hypnotised patient and B its result. Then a is ordinary suggestion, and b its effect on the attention; α is the modification of brain or consciousness by this hypnotic trance, and β its result (which I will take for present purposes as ascertained) in focussing attention in an extraordinary degree on the "control." The result B is the "possession" of mind and brain by the suggestion, which again brings further results in its train.

3. Limits of explanation and its ideal.

It has always been clear that while we might explain things satisfactorily to a certain point, we must come to a standstill somewhere. Two limits of explanation appear impassable. (α) No explanation of universals or particulars can tell us anything of the ultimate origin of things. From the cause of the here and now we go back to the cause of that cause, and so on *ad infinitum* in wearisome regress. We deduce particulars from a general law only with the aid of another particular.

It is beside the mark here to rejoin that the facts and their laws are not separated except as abstractions. This is obvious at a glance. But it points to no approach to explaining how the given, with all its uniformities, came to be in the first instance. If we could deduce every possible law from the mere conception of being, still the question would recur, how being came about. The chain of facts is endless, and must to our intelligence, unless or until it evolves into an altogether higher phase, remain so. Explanation must always assume something as given.

(β) Similarly, explanation must assume elementary laws, though not in the arbitrary and disconnected manner which has sometimes been supposed. We have spoken already of a certain "explanation" of these laws, but it must have occurred at once that such explanation must here be qualified. If $A - B$, $a - b$, $\alpha - \beta$ are three elementary laws, I may indeed connect them together by showing how $\alpha - \beta$ mediate between the other two, but which after all is the ultimate fact? If it be $A - B$, how then do I explain $A - B$? If by some other law the same question recurs. I must start from something as known, i.e. as proved by induction. So much must be granted, but we must at the same time claim that on our theory the fact started from is not the arbitrary isolated disconnected law which is ordinarily meant by the epithet "unexplained." On the contrary, we have at least as our ideal a connected systematic whole, the reason of which we find in its intrinsic

nature, in the precise point, that is, that it is a system. Hence we may remodel our position. The composite is explained by construction out of the elementary; the elementary by interconnection in a system; the system as a totality is that which requires no explanation, being itself the explanation of all its component parts.

4. Explanation and the causal nexus.

(a) Can we further characterise uniformities of sequence in such a way as to make them intrinsically more intelligible, that is, to show their dependence on the principles of reason themselves? As an ideal I think we can do so, that is to say, we can lay down certain points which we may expect to characterise our ultimate laws, and which make them "understand themselves" in such a way that their nature could even be inferred *a priori*—that "from the bare observation of the cause" we might deduce the effect. If anything can be meant by intelligible connections of things as opposed to what are "merely *de facto*," merely observed, and if such meaning was not already satisfied by systematic interconnection, I imagine that it would at least be content with this added fulfilment of its claims.

The character, then, that we require in a sequence as essential to its ultimate explanation must fulfil two conditions. It must be such that, by a simple application of the axioms of reasoning to a content, the effect might be inferred; and it must provide a basis on which the systematic interconnection of sequences already described may be carried out.

If such a character is to be found at all, it must be by reference to the idea of continuity already insisted upon as implied in the relation of cause and effect. Cause and effect, we have already noted, are separate names, implying separability in thought and observation, but not indicating that the contents thereby denoted are, in fact, parted by any interval of time or space. In view of this, the cause is sometimes held to be "identical" with the effect, but it would be better to speak of the effect as the continuation of the cause, to say, not that the effect is the cause, but that the cause *becomes* the effect. They form, in reality, one process or stream of existence passing before us. Certain points in the stream stand out with well-marked characters, and such of these as immediately succeed one another get spoken of as cause and effect, the interval being regarded somewhat obscurely as a blank, or perhaps as a latent process. In fact, these distinctions are in *ordine ad nos*. To the eye of the universe the stream is one and unbroken, and there is no more or less of importance where each section is the total condition of what

follows. Hence there is no more difficulty in speaking of causal connection as between the moments of a continued identity than in applying the same notion to a segment of a stream of change.¹ If this paper *stat mole sua* in the world, persists without need of further conditions to "support" it, then we may speak of its existence at this moment causing its existence at the next. All we mean is, that its existence is a continued qualitative identity which is self-determined, i.e. which, if it once comes into existence, persists always. If it is not fully self-determining, it persists on certain conditions. But its persistence, as qualitatively alike from moment to moment, is capable of just the same treatment as the propagation from link to link of any series of causal changes.

Thus the continued existence of substances, sometimes set in antithesis to causation, becomes for us rather a type or ideal of such a relation. Suppose I apprehend a content A not being itself a change. Like every other content it involves duration. We have then in it, in fact, a continued A. Now if we assume no other conditions, nothing external to A, to influence it, we must infer that this continuance would be perpetual. If A determines itself at one moment once, it will do so universally.² The mere existence, then, of a content not itself a process of change is, in the absence of evidence to the contrary, a ground for inferring its persistence. Here is the

¹ Cf. Javona, *Principles of Science*, bk. ii. chap. II. p. 259.

² It should be carefully noticed that we make use of the idea of identity in the causal relation only so far as deducible from the principles of generalization assumed above. In this way alone can the idea be applied without destroying the fruitfulness of causation as a basis of inference. The point is important, since the method of explanation by a phrase has had its say in the field of causation as elsewhere, and some thinkers have supposed all difficulties met by treating cause and effect as "two aspects of one phenomenon successively viewed" (Lowes, *Problems of Life and Mind*, 1st series, vol. ii. p. 362). Now on our view the alleged identity of cause and effect may have two meanings, which should be kept distinct: (1) Cause and effect are earlier and later phases in one continuous process. Here the identity is that of the unbroken continuity of a real process. (2) Cause may be used = constituent conditions, and effect = general result. In this sense (in one of Lowes' instances) the mixing of whisky, water, sugar and lemon is the cause of which punch is the effect. In this case the statement (op. cit. p. 361) is justified, that the effect is the fact of which the cause expresses the factors. The identity is that of a whole with its elements. But the temporal process is also a whole which can be analysed and so treated as a "general result" of "constituent conditions," and this procedure may be used dialectically as proof that all causation reduces itself to a "constitutive identity." This is to insist on one aspect of the case at the expense of another. We may analyse a process into interlaced elementary processes, but we can also analyse it into earlier and later phases, and the broad fact of uniform temporal sequence to which I should restrict the term causation) is that from one phase of a process a later can be predicted.

As between cause and effect proper, then, the identity is that of continuity, and the difference that of phases; it is not the identity of one "thing" under

simplest case in which the nature of the antecedent as such gives ground for the consequent simply and solely upon the principles of reasoning. Such a continuity would therefore fulfil the conditions essential for an elementary law. It can be understood without reference to any concomitants. If all concomitants were put out of question, the antecedent would contain ground for the consequent.

Paradoxical as it may seem, the same principle applies in part to continuous self-determining change, namely, so far as that change embraces elements of identity. Let a content B be a segment of a change from A to C; clearly, if the conditions continue unaltered, we shall get C out of B. For the nature of B is not a statical attribute but itself a change, and that in the direction of C. Hence the conditions, whatever they are, under which B comes into existence, must, unless they are altered, turn it into C. Every sort of familiar process from boiling a kettle upwards will illustrate this.

But so far we have not got a change that explains itself. The process of continuous change from A to C may depend on a single permanent set of conditions, but can it also explain itself? A, let us say, produces B, a step in the direction of C, but why should B carry this process further, for B and A are not alike? The kettle will not go on getting hotter of itself. If we wish a process of change to "explain itself" in the sense above assigned, we must look to the case where there is an element of identity in the change to which the changing

different aspects. But what must be made quite clear is this, that, *taking either sense of identity*, it does not help us one step towards explaining inference. The elements a b c, known as elements, are for us one fact, the whole as a whole another; to infer the second from the first is to make a real step. Even here Hume's contention, that from the "bare view" of the cause you could not, apart from previous experience, predict the effect, is abundantly justified. I may be quite familiar with whisky and water and sugar and lemon and with the process of mixing, but until I have seen them mixed I cannot tell what they will look or smell or taste like in combination. Doubtless the punch is but the whole which these elements form, but its character as a whole is, for my knowledge, a distinct fact, not a résumé of the facts already known about its components. And when I frame an idea of the character of the punch which you are now mixing, I predict a fact distinct from anything which I now perceive, and am justified in so doing, not because the said fact is identical with any other fact, but because nature is uniform. The theory before us attempts, in fact, to explain generalisation as an identical judgment. But the identical judgment is incontrovertible only when it is meaningless, and therefore can explain nothing. A judgment which connects different facts may be a judgment of identity, but is not a tautology, and therefore cannot rest on the principle of identity. "A is B," you may say, expresses an identity, and gives us real information. Very likely; but it is not self-evident. "A is A" is incontrovertible. Quite so; but it tells us nothing. You cannot find an assertion of identity which combines these advantages except by assuming the principles of generalisation.

elements can be referred. The simplest instance of such a process is that of motion in a straight line. A body so moving presents a continuous content, which is in certain respects qualitatively identical at each stage—in any segment of time wherever taken or however small. Such motion once begun, therefore, its persistence is to be inferred apart from any other considerations, i.e. is "intelligible" in our sense of the word. But now, as a matter of perceptual construction, such persistence—persistence in respect of these qualities—involves change in other respects, change of relation to surrounding bodies. Here, then, we have a process on the one hand intelligible on its own account as the mere persistence of a given fact, but on the other hand a continual change. Such a change, then, "understands itself."

So far we have considered the continued identity as involving change of relations only. But it may also involve change in other qualitative contents. Thus *a* and *b* may be so related that the continuance of *a* involves a modification of *b*, and that as a matter of perceptual construction. If you cut a stick with a knife the forward motion of the knife involves the severance of the stick, not as an additional result learnt by a fresh perception, but as a fact forming an element in a whole which cannot be perceptually or ideally constructed otherwise. To explain that the knife will cut this substance is of course a matter of ordinary inductive inference depending on the particular character of the substance and of the knife; so with the question of the sort of cut that it will make, a clean cut or jagged or a split. But that the motion of the knife through the substance involves the parting of the substance is rather a matter of direct constructive perception. Granting that the knife at any point holds the surrounding substance apart, then I have only to imagine the knife pushed on and the relation of the parts of the substance involved in the position of the knife is similarly transferred. And this relation involves a change in the character of the substance. This changed character may be permanent, as in the case of a solid, or may be again destroyed, as in the case of a liquid which closes up behind the knife, but this belongs to its further development. The point is that a change of this kind depends on a persistent content involving change as a matter of construction.

Just as content *a* modifies *b*, so at the same time *b* may react upon *a*. The principle here is the same, though the application is more complex, and the result is a new whole $\alpha\beta$, or perhaps a more fundamentally different *cd*, which is the result of the action and reaction continued to the end. Thus

in the old example of the billiard balls, white knocks up against red, which is stationary; red moves on while white comes to a stop. Now beginning with white, it presents a continuous motion in a straight line, but from the point where this line meets the surface of red we see, as a matter of construction, that the continuance of white's motion must introduce a change into red. What sort of change will that be? If we knew nothing of the permanence and mutual exclusiveness of solid substances we might say that white would pass into red. Thus if white were a spot of colour, the two colours would join and modify one another in point of quality. Postulating, however, that red and white exclude one another from the same point of space, we get in the two balls two counter tendencies. If white's motion were to continue unaltered, it would pass on, driving red before it with undiminished speed. If red's state of rest continued, it would arrest white's motion at the point of contact. Here, then, from the two causes taken apart from each other we have results of opposite quality, which results, when forming one whole, will accordingly modify one another. Thus the effect of white in altering that of red will be subject to an alteration itself,—white's onward movement tending to displace red, while red's inertia tends to retard white. Thus red will begin to move while white comes to rest. Lastly, the magnitude of the change effected in red must depend on that of white's result as such, i.e. upon the energy exerted by white, and so with the change effected by red. The states thus induced on the two bodies will in their turn be permanent until subject to further influence working on similar principles.¹

Starting, then, from a given content as possessing certain permanent characteristics, and as continuously changing in certain other respects, we can understand, as a matter of constructive necessity, how it introduces changes into other contents or itself becomes changed by them. That is, from certain principles of persistence we can understand change.

Bringing our various methods of explanation together, the principle we have used may be called that of persistent identity. The simplest case is that of pure identity, $A - A - A$, not containing or involving any difference. Here the simple

¹ The above account is perhaps enough to show in general how a qualitative change can be "intelligible." Of course, to work it out in detail would require a reference to laws of elasticity and to molecular forces ignored for the sake of simplicity in the above discussion. These laws and forces, however, I would suggest have been largely inferred from the necessity (however obscurely felt) of maintaining the principle of continuity as operating in all cases of the continuation of motion by impact.

observation of A is ground for inference to A—A in the absence of known reason to the contrary. The next case is where we can distinguish identity of content amid difference of relations, as in the case of motion in a straight line. Here the persistence of the identical content observed for a given segment is ground for its persistence indefinitely,—in the absence of reason to the contrary,—while involving constant change of relations. Lastly, the case of qualitative change, though presenting difficulties, may be brought under our principle. For two contents may be so related that the continuance of the one involves a change in the other, or in the more complex case the continuance of each involves changes in the other. Without pretending that the above account is at any stage final or complete, we may point out that we have here a form of explanation which may conceivably be applied to any facts of permanence or change. Any law reduced to this form is explained in the sense that the character of the antecedent is shown to be as such an adequate ground for the consequent as a direct deduction from the principles of reasoning.

There would seem then to be two forms of "necessity" to which explanation tries to reduce all phenomena. The first of these is the constructional necessity, the relation of whole and parts which we have dealt with in a previous chapter. The second is that of continuity. What is must continue unless something modifies it; and what modifies it must be in its turn a continuous process, and the whole resulting must be a construction of the elementary continua, whether these are identical or changing. By these methods we can bring the laws of sequence into a definite relation with the nature of the contents related. The fully "explained" sequence will rest directly on the principles of reasoning, or on these together with the laws of construction.¹

¹ Mr. Bradley (*Appearance and Reality*, bk. I, chap. vi.) argues that the idea of causation is self-contradictory. In the main, his reasoning rests on the ideas of pushation which we have already considered, and on the infinite divisibility of time of which we have also spoken. But his two arguments specially affecting causation must be noticed. (1) Supposing A different to B, and that it is suggested that A with C produces B, he says, "In 'A + C followed by B' the addition of C makes a difference to A, or it makes no difference." In the first case "A has already been altered; and hence the problem of causation breaks out within the very cause. A and C become A + C, and the old puzzle begins about the way in which A and C become other than they are," and hence an endless regress. But clearly, if the addition of C—or, as I should put it, the action of C on A—makes a difference to A, this does not imply that A has already been altered. It implies that A is now altered, altered so as to be a process in the direction of B. This alteration is not antecedent to C, but is the immediate effect of C itself as acting on A. No further cause D is therefore

The truth is, that upon this point we have now seen reason to reverse the dogma of Hume, in the same way and with much the same result as recent thought has already reversed it in other directions. Hume rather than Locke was the true parent of a psychological figment which has influenced the whole history of philosophy since his time—the atomic sensation. The sensation was conceived by Hume, not always consistently, but in the main as spaceless, timeless, relationless. And, what is curious, Kant trying to correct Hume, and later idealists trying to correct both, have not reversed but have insisted more and more on this character of sensation taken by itself and as such. Whence came the need to supply space and time relations, the causal nexus, the substantiality of things, and all else that transmutes chaos into order, from an armoury of the mind's own providing. And when it was seen, as already

required in the matter. (2) Causation must and yet cannot be continuous. I notice only the reasons against continuity. "For this would mean that the cause was entirely without duration. It would never be itself except in the time occupied by a line drawn across the succession. But since this time is not a time, but a mere abstraction, the cause itself will be no better." The objection applies to causation as the ground of change, but it rests on a misconception of the nature of change itself. The cause A of an effect B is not a statical or unchanging fact, but is the process leading up to B. Take a section through any point of this process and you find, not a fixed attribute *a*, fixed and therefore existing only for a point of time, and therefore an unreal abstraction, but a passing process of change persisting through time, and therefore real for that time. Change is to be conceived, not as consisting of parts A, B, each of them stationary, but as a movement continuously passing from A to B. A phase *a* in a change A B resembles a permanent attribute *a* only by abstracting the fact of change from it. Really, such a phase is never *a*, but *a* - becoming - *a* - or *a* - becoming *a*'. The character, then, of a changing fact does not really contain a plurality in one moment. This supposed plurality is a difference of statical characters, but it has not got statical characters at all. The problem is identical with the old dropia of motion, which is brought up anew by Mr. Bradley (*op. cit.* chap. v.). The moving body "is" not in two places at once, nor "is" it in one at once, it "is" not in any place at all in the sense which the paradox wants us to imply, i.e. it is not resting in any one place. Its motion is not a synthesis of two rests with a jump between, but is a state of the body which we can only define by contrasting it with rest. It is moving through space during time. Shorten the time and you reduce the space. Annihilate the time and you bring the space to zero. But just at this point you have lost reality altogether and fallen into abstraction. You make an unreal premiss and are surprised at reaching an unreal conclusion. You do away with time and are surprised to find motion cease as well. So is it with change. The change is real in time and in any different moment presents a plurality of characters. Crystallize these characters, i.e. suspend the conditions maintaining the change, and we have two statical points, A and B, as the first and last stages of the process. But A and B with a jump do not make up the process. It is a continuous alteration of A into B, which as before is less and less the shorter time you take, and in an abstract section of time is an abstract section of a changing fact. In fact, there is no difference as to reality between change and persistence. The permanent A is neither more nor less real in any point of time than the changing A B. Both as real till time, and they differ only in that one fills time as a segment of an identity, the other as a change.

implicitly by Fichte, that the sense datum on the one hand, and this nexus of relations on the other, were, in fact, abstract expressions of two sides of the same concrete whole, the effect was not to rehabilitate the given, but to extend further and further the scope of the mind's activity, so that not the order of things only but their whole existence was assigned to the creative understanding. But now the question arises, what warrant have we for thus attenuating the character of sensation? Do we know of any sensations that do not contain duration as an element? Have we any experience of "coloured or tangible points" themselves spaceless, which either laws of association or a timeless ego could build up into a world of space? Lastly, in this chapter I ask whether the causal relation itself may not be in an elementary way given? Not, indeed, that mere observation could distinguish the universal from the contingent, but that it may suggest universality. It may present us with the pieces of our fabric in a form in which they are already fitted to take their places in the whole. In the final analysis we may probably find that in building up the system of knowledge not all the construction is done by thought, but bricks, and mortar too, are supplied by sense in a shape which goes to determine the construction.

(b) At an earlier stage in this chapter we have insisted that not only can some things be explained, but that in the last analysis everything, every part of the great whole of being, must be explicable. And we have seen that on this postulate inferences might be founded leading to the rejection of this or that sequence as inexplicable in view of other sequences taken as established. The present discussion might suggest a still shorter and more certain method of forming inductions, one which would dispense with many of the doubtings and balancings of probabilities which we have been compelled to admit into our account of generalisation. Assuming the present account of explanation, it might be said that here we have a test of causal connections. For every fact must have an antecedent which will explain it in our sense; and conversely, no antecedent whose action cannot be "explained" can be admitted as relevant.

It is clear that this conclusion would take us very far from the true spirit of inductive science, which has owed much of its success to the determination not to reject that which it does not yet understand. Put in terms of theory, the reply comes to this, that the effect of any fact *M* may not be understood, either because our analysis is imperfect or for the more simple reason that the factors *X* or *Y*, working with *M*, are not

observed. The inference from the inexplicable, then, could only be applied if we had a complete knowledge and understanding of reality, in which case we should not want it.

The utmost we can say would seem to amount to this. Supposing all methods of explanation known, and supposing a sequence A - a to be explained, that sequence will be necessarily universal, for a modification of it will involve the overthrow of some principles of continuity or construction. But supposing the principle of continuity itself to be applicable only on certain conditions, we must know those conditions before we can ground an inference on an explanation. We shall see in a following chapter that there are certain conditions upon which, and upon which alone, we can be sure that a content will persist. Only if these conditions are taken into account, only, we may add, so far as they can be laid down and made sure of, can we apply the inference from continuity with any certainty. With these limitations, the result of which will be clearer later on, the argument from explanation is a method which may be combined with those of elimination as an independent source of probability. We cannot say offhand, "This is intelligible, therefore it is true." We may say, "In accordance with such principles of sequence as are known to us this should follow; there is therefore no real ground for doubting that it will happen; it has therefore a degree of probability approximating indefinitely to certainty."

(c) Our account of the causal nexus will not be complete without some attempt to discuss a question left over from an earlier chapter. Are we to recognise plurality of causes? Is uniformity in causation all one way, or is there also a principle by which we can go from effect to cause? Hitherto we have recognised plurality of causes. The axiom of reasoning merely stated that there must be a cause, but not that the same consequent must always have the same cause. And when in dealing with the explanatory method we spoke of inferences to the cause from the effect, we based our procedure on no arbitrary assumption contrary to the plurality of causation, but merely on observed uniformity of causation as given us by simple enumeration and the method of agreement. We have now, however, to ask whether in the last analysis plurality of causes is a possibility, and, if so, how we are to understand the principle?

At first sight the doctrine of the plurality of causes appears as the innocent expression of obvious facts. All roads lead to Rome. Human ends can be compassed by most diverse means; and natural events are produced by the most heterogeneous causes.

You may die of cholera or consumption, of prussic acid or a broken heart. So far we get on a first view of the subject in which by the cause we mean the concrete sensible antecedent, or so much of it as strikes our attention as interesting or important.

But as against this view, to begin with, it is possible even in cases of the greatest apparent difficulty to resolve plurality into an underlying unity. The alleged plurality of causation, in fact, is for the most part the result of a very partial view. Some part of a totality has very different causes perhaps, but a closer inspection would show that where the cause differs, there also the totality of the effect differs; while, conversely, in all the different causes there may be some element of identity. Thus α is apparently due to two very different causes X and Y, but analysis resolves X and Y respectively into A B C and A D E, while further comparison shows that the first α was part of the whole $\alpha \beta \gamma$, and the second X part of the quite different total $\alpha \delta \epsilon$. We get, then, not the crude

$$\begin{array}{ccc} X & Y & \\ \alpha & \alpha & \\ A & B & C \\ | & & \\ \alpha & \beta & \gamma \end{array} \qquad \begin{array}{ccc} & & \\ & & \\ A & D & E \\ | & & \\ \alpha & \delta & \epsilon \end{array}$$

in which we notice three things: (1) The causes *quâ* different have different effects ($\alpha \beta \gamma$, $\alpha \delta \epsilon$); (2) *quâ* similar they have similar effects ($A - \alpha$); (3) not only has α , if you take it in the abstract and its antecedent in the concrete, two different causes, but A if you take it in the same way has two different effects. The suggestion results, that in the last analysis causes *quâ* identical, and only *quâ* identical, have identical effects; that plurality of causes is an idea that comes from a partial analysis which makes us take the effect more abstractly than the cause, and that by a similar process we could get equally well to plurality of effects. But our principle should be, same cause, same effect; different cause, different effect.

This resolution of differences may be carried a great deal further when we remember that likeness may be not only simple or direct, but constructive. Two constructions are similar, however different their elements may be, if their resultants are alike. Thus a system of forces P Q R may be dissimilar in number and separate quantity and direction to a system S T, but their resultant may be the same. And this does not only mean that their effect (the perceived motion) is the same. If this were all there would be undoubted plurality of causes. It means that their resultant pressure as a *felt fact* (if the forces are acting on a portion of our bodies), or as inferred from a felt

fact (if otherwise), is alike in the two cases, and this is the explanation of the similar effect.

The distinction between the apparent plurality and underlying unity of the cause coincides partially with that expressed by Bacon in the distinction between the *causa physica* and the *forma vera*. The former was *fluxa, nihil aliud quam formam deferens in aliquibus*, the object of sense differing according to the matter, while the most widely different *causae physicae* cohere in *formam*, which *naturam unit in rebus dissimilibus*, which produces the effect in *omnimodu materia et subiecto susceptibili*. Thus in Bacon's own instance the *causae physicae* of heat are many and various. Friction, combustion, pressure, the liquefaction of a gas, the solidification of a liquid—what have they in common? Precisely this, the transformation of some other form of energy into vibratory motion. This common characteristic makes all bodies undergoing any one of these processes "hot," if we are to regard heat as a quality of the bodies; or a stimulus producing increment of heat in a normal nervous condition, if we are to regard heat as a modification of our feeling. All these causes have a common point which gives them a common effect. All have individual differences which give them otherwise different effects—what else is there in common between the effects of friction and of freezing? As identical their effect is identical; as different, different.

But now if we grant that this is so in some cases,—that plurality has been resolved into unity in many instances, especially in mechanics and all sciences immediately depending thereon, and that by analogy it may be expected that the same process may go further in other cases also,—can all this be ground for the extreme conclusion that all plurality must be similarly resolved?

This conclusion may perhaps be true, but I do not think it can be inferred from the principles of generalisation hitherto assumed, and if these principles are adequate to the explanation of inductive reasoning we shall go beyond our book if we lay down any further assumption as axiomatic. We must confine ourselves, therefore, to setting forth the results which can be arrived at from our assumptions as already made. These appear to be two.

(a) Different causes have different effects; and any effect is either a whole or part of a whole which has always the same cause.

The argument here is from what we may call inverse uniformity. A causes B. Then B is caused by A. But if B is caused by A in certain instances, it will be so always unless there is a reason for the difference. Now if, not B, but B C is

the total effect of A, and if, in a fresh case, we have not B C but B D, there is a very obvious reason for a difference in the cause. A cannot be the cause of B in both instances. Conversely, if B is the effect, and the whole of the effect of A, it would seem that A must also be its only cause. For consider the relation A - B, and ask what determines it. Nothing outside of A and B, for A is the whole and sole ground of B. But A and B are each essential to the other; for A is the ground of B, and if B were other than it is, it must have some other ground. Hence B stands in a relation of sequence to which no fact other than A and B themselves is essential. But such relations are universal. It follows that the *total* effect of any cause always presupposes that cause and no other. Whence, conversely, two different causes cannot have wholly similar effects. When the causes differ, certain concomitant elements of the effect must differ also.

(5) An effect may have as many different causes as there are ways of constituting it by construction of elements: or different causes of a given effect are composed of elements, the results of which form by construction similar wholes.

Consider any elementary cause *a*, understanding by the term elementary that the content does not admit of the working of two processes on one another, but is a single and simple self-determining content. The "result" of such a cause will, as we have seen, be simply the persistence of the content—a persistence which may or may not involve changes in relation to other contents. That is, the consequent of *a* will be *a*; and similarly, the consequent of *b* will be *b*—a different effect for every difference in the cause. With strictly elementary causes there is no question of many causes producing the same effect.

But when elementary causes combine with one another, a different result follows. It is true that if A and B, C and D work together, the total results α , β , γ , δ must be different, but they may also in certain points be alike. The effect for which we are seeking a cause may be a whole or a certain characteristic of a whole, which may be constituted by very different elements. No doubt, since these elements must in every case "come to the same thing," there must be certain fixed relations between the different ways of constituting the whole. But still, by combining what are in themselves, and therefore in their antecedents, very different elements, we get totalities which are in some respects alike. I can form a square by putting together two triangles or two oblongs. And as far as a fact may be so differently constituted, so far may its antecedents differ among themselves.

As between the different modes of constructively constituting the whole, there is always *ex re termini* a certain constructive similarity. Its different elements have just this common character, that they form this particular totality; and this is, as we have all along held, a character attaching to the elements themselves taken together. In certain cases we may attribute a similarity of this kind to the different antecedents of a result. Thus in mechanics we think of the resultant force as the true antecedent of the motion, and we think of that force as the point of similarity in all systems of forces that will produce just that motion. But as a point of similarity it is of course obtained by elaborate construction and analysis. In other instances there seems no point of similarity to be assigned as attaching to the different antecedents as such. They terminate in the same point, and that is all that we can say. Taking the instance already used, and pushing it back a step further, what common character can we find in all the forces which, acting on one another, produce ultimately a system with a given resultant at a given point? They have not themselves a fixed resultant, but they produce changes, concentrations, and dissipations of energy that result in one or other of the systems with the resultant required. There seems no point, therefore, in assigning them any common character beyond the bare fact from which we started, that they have a common result.

Our conclusion, then, is that plurality of causes depends on plurality of constructions. It is, of course, impossible to verify this result in detail. It could only be tested by an appeal to facts of observation, if we were in possession of a complete explanation of all effects in the world. But it is at least the most probable result suggested by what we can understand of the ultimate nature of the causal relation. Antecedents do not cause consequents anyhow. There is, undoubtedly, some definite principle determining all causal relations, but that principle may not entail strict uniformity of character in the cause, but only such limitation as is involved in the principles of construction whereby the effect is constituted.

One last point should be noticed. On our principle, comparing different causes, we expect to find the differences compensating one another. If I modify a system of forces in a certain manner I must introduce a corresponding change of a different (in this case of an opposite) kind in order to maintain the same resultant. And on the view of this section some such "compensation," however difficult it may be to phrase it with an universally suitable name, or to assign it in

every particular case, must be imagined as always occurring where causes are many. Then, on the one hand, the occurrence of many causes of an effect is always "casual" in character, depending, so to put it, on the meeting of just the appropriate differences. On the other hand, a principle which we have already used in considering the joint method follows as a deduction. If different elementary causes a and b act on the same element c , the total results $\alpha\gamma$, $\beta\gamma$ cannot as totalities be alike. They must be constituted of elements of which some are like and others unlike, and likes added to unlikes will make unlikes. There may, of course, be an element of identity γ due to the common antecedent c , but the wholes in their character as wholes will differ.¹ Broadly, if wholes are to be alike, but differ in one constitutive part, they must differ in a compensating manner in the other part as well.²

5. The element of variability.

Connected with the question of plurality of causes is a point of some interest bearing on the possibility of a complete explanation, or to use a more general term, systematisation of existing facts. In any complete system based on the idea of the universal it should be possible either to generalise any given relation or assign reasons, which must again be general in their character, differentiating this relation from any other which contains a similar term. In this way the variable is usually held to be explained by the uniform. Everything is in accordance with law, only the laws are entangled together and so give apparently irregular results.

But the question arises, how far this reduction to uniformity can be carried. Clearly, starting from certain points,—taking this or that collocation of causes as given,—we may be able to show that everything else follows uniformly without break or exception to any universal truth. But why should we start from one point rather than another? and if we can assign no reason for such procedure, can we take the further step which would seem necessary to a complete systematisation of reality, and assure ourselves that at whatever point we start, whatever relations we consider, law will reign supreme, and there will be found for each relation an universal ground?

¹ It is possible that there may be elements in a and c forming some abstract character of the whole $\alpha\gamma$, which agrees with a similarly formed character of $\beta\gamma$. But this, again, will be a mere "chance."

² The above discussion, of course, owes much to Mr. Bosanquet's analysis of cause and ground (*Logic*, bk. i. chap. vi. pp. 284 ff.). But I cannot feel as confident as he does of the ultimate identity of the ground in any fruitful sense. But the matter, at least, requires more discussion than is allowed it by Mill (*Logic*, iii. x. 1) and Schopenhauer (*Sufficient Reason*, § 48), who simply state the plurality doctrine nakedly and leave it unaccounted for.

This result would follow most easily if we carried the doctrine of the preceding section a step further, and threw over the plurality of causes altogether. We could then generalise each causal sequence in the fullest sense. Let us see what would result.

If every sequence is really "convertible," so that when we can argue from A to B, A being the total and the sole antecedent, we can also proceed from B to A; this will hold of all sequences alike, and of all facts whether they are universal wholes or casual conjunctions. Now, let any conjunction $M - N$ be considered. It must have an antecedent L , such that we can argue $L \therefore M - N$, or $M - N \therefore L$. Now there are two possibilities. Either L is the universal of A and B taken separately, or it is not. If it is not, we have plurality of causes. M in some other context is produced by λ and N by l . But if we reject plurality of causes, this is impossible as a statement of the final analysis. Hence M and N can only have the antecedent L . But L is universal to $M - N$, \therefore the conjunction $M - N$ is invariable. But not all conjunctions are invariable. How are we to explain this?

Put the case again, beginning from the assumption that $M - N$ is a variable conjunction—say, fine weather and a picnic. What is M 's antecedent?—say λ . Then $\lambda - N$ cannot possibly be universal, or we shall have $M - \lambda - N$ and $\therefore M - N$ universal, which *ex hypothesi* is not the case. What, then, can N 's universal be? Say l , and $\lambda + l$ may constitute the whole L . But—and this is the important point—the conjunction $\lambda - l$ must itself be variable. For if it is universal we have $M - \lambda - l - N$ all universal, whence $M - N$ would be universal too. Thus, if fine weather (M) followed always on given meteorological conditions (λ), which also infallibly and alone produced a certain temper of sociability and excitement (l) leading us to arrange the particular somewhat questionable form of entertainment mentioned (N), our picnics would always fall happily on fine days. It results that if L be the cause of $M - N$, L itself must be composed of elements not universally conjoined. The antecedent of a variable relation must itself be variable. This, I take it, will hold indefinitely. The same argument can be repeated for l and λ , and for their antecedents in turn. Hence, admitting the *de facto* variability of nature, we must postulate a variable element running right through it, and never resolved into uniform sequence from any conditions whatever. We can no longer explain variety as all issuing by uniform laws from necessarily determined conditions. Each variable relation must indeed have conditions, and from these

it must follow uniformly, but, as it would appear, as a consequence of the same principles a corresponding element of the variable must crop up again always and everywhere in the grouping of these conditions themselves. The "casual" conjunction, like every other fact, has antecedents which it follows uniformly, but in these antecedents there is the same variability. "Chance" is a fact and not a fiction. It is no mere expression for our ignorance, nor is it the name of some mysterious agency. It is a word which expresses, perhaps not very happily, the fact that the natural order exhibits variety no less than uniformity.

If this conclusion seems paradoxical, I would ask whether any good ground in experience can be alleged against it. Whenever we have any concrete phenomena to explain we proceed, no doubt, through laws which are abstract and general, but these laws do not hang suspended in intellectual air, nor are they derived from a first principle of existence. They show how certain other concrete beings might have produced these now present; and if we are "satisfied" with the explanation, it is because we already take the alleged antecedents as known, or as probable, or as accordant with general knowledge. Thus, if we try to explain the presence of flora and fauna on a certain island, we are satisfied if they are such as could easily get there by air or water from a neighbouring continent; or if this hypothesis is inadequate, and geology tells us that the island was once a peninsula, it is easy to suggest that the fauna once walked there. But why these particular species? Why these genera? Why this order and not that? Why is this island richer in this respect than its neighbour and poorer in another? For the most part we shrug our shoulders at such questions, and answer, Who can tell? No doubt some explanation might often be given, in the situation or character of the islands, or in the earlier distribution of animals on the mainland, in the habits of seed-carrying birds, or what not. Not only are there more things in heaven and earth than are dreamt of in our philosophy, but there is a philosophy for more things in heaven and earth than our philosophy itself yet dreams. Still, to what, after all, are we constantly driven back? To the actual, factual, then-and-there collocation. It is so because it was so, and that is why it will be so. We are content if we wipe away the improbable, if we resolve the strange and unique into the well-known or even the average; but we cannot undo the individuality of existence. The world does not become less concrete by being explained. Nor can we get rid of our difficulty by reintroducing the plurality

doctrine. Assume for a moment that M has two separate and distinct causes L and K, that L gives us M - N, while K gives M - O. Why, I shall ask, has this particular M the antecedent K? Because it has N for its concomitant. Why has it N? For whatever reason the economy of things may please, but not *ex hypothesi* a reason that makes M - N universal. Or, it may be replied, you have no business to ask the why of a sequence K - M. K is the reason of M, and that is enough. But this is a one-sided view. Looked at in the direction K - M, we have an universal sequence, and all is satisfactory; but looked at the other way, it seems a pure "chance"—much purer if you reject the unity of causation—whether any given M shall have K or L for its cause. It is a one-sided necessity.

We may put the matter more clearly by reverting to the doctrine of causation to which we were finally led in the preceding section. Grant that M has two "causes," L and K. This means that each of these three expressions is a synthesis of parts, and the concomitance of these parts must be regarded as casual in character. For if the one brought the other into being, we should have the part as such constituting the whole. Our dilemma, then, is clear. So far as we have plurality we have variation in the conjunctions forming the cause. So far as we have uniformity of causation we must have variable conjunctions as between different causes. In either case variety in the effect postulates antecedent variety, and this *ad infinitum*.

On the whole, then, there is reason to suggest—at least as a possibility that must be faced in constructing in idea the fabric of knowledge—that the variable element in nature is not to be resolved into a complex effect of interwoven uniformities: that uniformity is not in everything, though it interpenetrates everything.

One point remains to be noted. We naturally think of uniform necessity as existing between the facts of temporal sequence, while variability, if we admit it, has its root and ground in the coexistent. If you figure to yourself straight lines drawn across this page from top to bottom, and other lines crossing these at right angles, and if you think of the whole page as the stream of time advancing from the top downwards, while everything in the same horizontal line is contemporaneous, then if we are told to distinguish necessary sequence and casual conjunction, we should naturally think of each vertical line as forming a chain or (as we prefer it) stream of necessary sequence, while the casual collocations are the

relations of any of its points, or of the line as a whole, to its contemporaries; or, if we figure it thus

A	M	V
B	N	X
C	O	Y
D	P	Z

we suppose each sequence *A B C D*, etc., to be necessary, while *B N*, *O Y*, *D P* may well enough be casual collocations. Of course, however, if *B N* is casual so also is *N C*, though they form a temporal sequence; but we should "account" for this by referring *C* to *B*, while we leave the casual character of *B N* untouched. In other words, we assume that any fact which can be taken as an event in time has its ground in a previous event in time. This assumption is not free from difficulties, for our original position in the matter was merely that any fact must have some ground, i.e. that there must be some other reality to which it is related universally. Again, in actual reasoning we use as logical grounds things that certainly cannot be temporal causes. And though in Chap. VIII. we saw reason to maintain that the ground or consequent of an event in time must be continuous with its correlate, this was not enough to justify our position; for why should not *C*, which is later in time, be the true ground of *B* rather than *A*, which is earlier? *B* would then have a logical ground, but not a temporal cause.

The solution of this problem, which we left untouched in Chap. VIII., seems to depend on the principle of continuity. Just as you can start from any fact in time *A*, and argue forward to its continuance, except in so far as it is modified by concomitants, so you can start from *C* and argue backwards to the previous existence either of *C* itself or of something that became *C*. Now, suppose *per impossibile* that in the succession *B - C*, *B* is dependent on *C* alone. Then tracing *C* backwards, it passes into *B* as its (logical) consequent. But wherever we take this regress, it is either a process or a persistence; we have either a change from *C* to *B* or a persistence of *B*, or in *B* itself a change to something anterior, as *A*.¹ Of course, *A* may be replaced by *E*, if *B* is accompanied, say, by *D*, which is such that *B D* pass back into *E* as their temporal antecedent. But this is only an instance of difference of cause with difference of total effect, and *B* will still have its share in determining what *E* has been. It follows that the causal process cannot begin at any point, and that there must be similarities and

¹ That *B* cannot be a process ending in zero is argued lower down, Pt. III. Chap. IV.

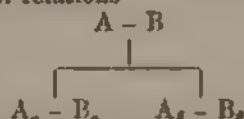
differences in the temporal antecedents at any moment corresponding point for point with those in the consequent. The temporal antecedent is not *the* ground *par excellence*, but it is a correlate necessarily implied, and necessarily implying what follows, and therefore a ground from which we can logically argue.

6. *Explanation, Classification, and Description.*

Before asking whether in explanation we have the ultimate and highest ideal of science, we must compare it with its possible rivals in the other "systematic forms" into which advancing knowledge ranges the facts of the universe. The principal of these is known as Classification with its correlative Definition, or, as I prefer to call it, Description.¹ We therefore must inquire what classification does, and how it is related to explanation.

All these scientific operations—and we may add inference and even the judgment to the number—grow out of a common matrix, and depend upon a single comprehensive principle. The principle is that of the relation of the general to the particular; the common ground of all intellectual operations is that they deal with and exhibit this relation, while the special character of each depends upon the particular side of the relation that they take up, or the particular attitude of the individual mind, with its hitherto ascertained quantum of knowledge, to the whole of the facts.

Thus the group of relations



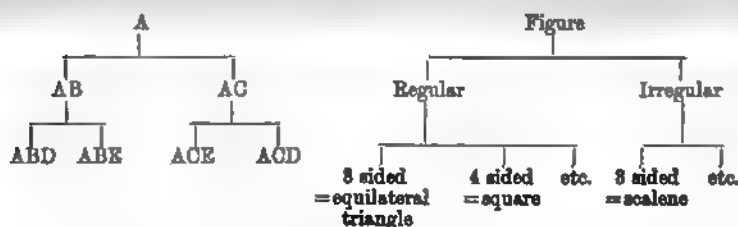
where $A_1 - B_1$, $A_2 - B_2$ fall under $A - B$ as specific cases, presents opportunities for all these modes of operation. I may first, by *induction*, infer $A - B$ from $A_1 - B_1$, and from $A - B$, by *deduction*, infer $A_2 - B_2$. This I shall do if $A_1 - B_1$ are first observed, and subsequently A_2 . I may, second, *classify* $A_1 - B_1$, $A_2 - B_2$ as species under the genus $A - B$; or, again, *describe* either member as the relation $A - B$ differentiated by the quality α or the quality β . Or lastly, I may be said to *explain* either of the special relations by reference to the generic. The cases of inference on the one side are distinguished from those of description, classification, and explanation on the other,

¹ Definition is in effect conventional description. It is a selection of certain attributes from a group for assignment with a view to a special purpose (e.g. distinction from other species), and in accordance with certain conventionally-understood rules.

not by the facts dealt with, but by their relation to the existing store of knowledge. In the latter case we presume all three relations to be known. In the case of inference, by means of the one relation we come to know the other. Inference, then, is not itself a systematic form of knowledge, but a method of forming judgments depending on the same principles and relations of facts as those which generate the said forms.

Coming now to these forms, we see that they agree in subsuming particulars under a general. As to their difference, we have already discussed the character of explanation at considerable length, and it remains to set out that of classification and description in more detail. *Prima facie* we may distinguish two main forms of classification, which, for reasons which will be clear as we proceed, we may distinguish as disjunctive and subsumptive.

(α) Disjunctive classification proceeds by added determinants without seeking in them any common character. It has no guiding principle, except that of enumerating exhaustively (or sufficiently for the purpose) all possible cases in which the generic content with which it starts may be found. Thus A is found in the cases AB and AC; again, AB may be ABD or ABE, while AC may similarly be ACD or ACE. Then we have



The value of such an exposition is usually relative to its special purpose. Speaking generally, it amounts to a complete and systematic exhibition of the affinities of a certain set of contents. The various differentiae found to determine a general characteristic of reality are enumerated; or (better), starting from the more concrete contents we find the various points in which groups of them resemble or differ, and this in a complex way, since we point out at once the resemblances and the differences. A classification is, in short, a construction of comparative judgments. A description is in form nothing more than an ordinary analytic judgment, but it may in form and even in matter be determined by relation to some classification.

And while this form of classification rests on the judgment, and that alone, in description there is potential inference, seeing that by the principles of construction the same elements must always give the same whole. This generalisation, however, should not be regarded as the aim of description proper, unless it is explicitly laid down as such.

(3) Subsumptive classification is a name which may conveniently be given to all systems which seek to proceed on a single principle. Here our actual procedure may be of two kinds. We may be struck by some particular distinction between things, some characteristic differentiation, and we may try to fit this differentiation on to successive classes. The differentia itself may perhaps be modified, but its modifications also must exhibit some principle. Thus certain affinities and distinctions of sexual character are fastened upon by the Linnean system, and are carried out right through the vegetable kingdom. In this case we begin with the principle and fit the facts into it. Or, secondly, we may begin by arranging the facts in accordance with some principle not understood by ourselves, and may then, when the arrangement is far advanced or even complete, come by comparison and analysis to discover the principle of arrangement. This was the history of the "natural system" of classifying plants and animals. Darwin has shown¹ (and I imagine that this result holds good independently of the evolution hypothesis) that naturalists, almost (or entirely) without knowing it, in forming the natural system, have been employing the principle of inheritance, i.e. have been arranging orders, genera, and species by *affinities of the kind which inheritance would produce*. This affinity was, till Darwin, unanalysed. It was effective, it was felt. But it was not understood. It was effective in determining the classification, but was not known to be so. Darwin's analysis altered this. Here, then, we have a principle first used and then declared; as, before, we had it first declared and then used.

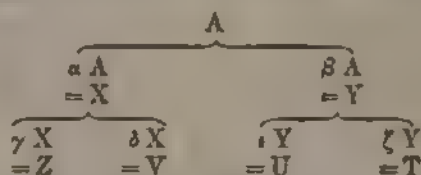
In either case, however, classifications of the kind now before us are distinct from the former sort, in that they attempt to follow a single principle or system of principles. They are thus also in a way inferential in character; for given one part of the classification effected, the further orders and families and genera fall one by one into their places by a sort of necessity. If we are to carry out our principles, they must have the place assigned to them and no other. Conversely, the attempt to carry out the principle is itself a kind of experiment, like an

¹ *Origin of Species*, chap. xlv. p. 362, etc. (6th ed.).

incomplete deductive inference that needs verification. For our method of classification may now be said to be "correct" or "incorrect" as a whole or in any part. If we want to arrange a given whole, and begin with a principle which clearly fails to give us all the distinctions required, that principle is "inadequate," and so far false—not the principle required. The disjunctive classification, on the other hand, could scarcely be incorrect, unless memory or words actually misrepresented the given facts of similarity or difference.

Subsumptive classification is thus transitional in character. It is no mere combination of comparisons, but expresses some systematic interconnection of facts which may, if such be the purpose of its framers, give us deep insight into their character. Thus from classification in such a science as biology to explanation is but a step. But there is a step nevertheless. As long as we retain the purely classificatory point of view, we note *de facto* resemblances and differences; but no reason is assigned for these. Explanation assigns the reason. It shows not merely how the generic content has become modified in the species, but why it is so modified,—what has modified it. That is, it assigns the ground of that which classification only describes.

Let us first exhibit the difference schematically. In classification we have



Here, if we take the Greek letters as bearing some definite relation to each other, we have a subsumptive classification. What is effected by it? Each point of difference—between X and Y, between Z, V, U and T—is analysed, and the differences themselves have their respective affinities. But no reason is assigned why A should be affected by the differences α and β ; nor, again, why those A's which are already differentiated as X should have the further qualities γ and δ , while those which form the group Y are further distinguished by ι and ζ . In all these points we are simply analysing and recounting facts which we take as they are given. Now, if we were explaining we might (for instance) take the content Z and show how it followed from the combined antecedent γ and X. Here, so far as we assume the antecedents γ and X, we are taking things just

as they are, precisely as in classifying. But when, given the antecedents, we go on to analyse them, and show how, part by part,—in accordance, if you like, with the law of continuity, or, if we are to speak more generally, in accordance with laws already known as operating in other sequences,—each is responsible for its part of the effect, then we have explained, first, the effect itself, and, secondly, the law. Thus our scheme of explanation is rather

$$\begin{array}{ccc} A - B & & B - A - C \\ | & & | \quad | \\ X & & X \quad Y \end{array}$$

This for the particulars X or Y. For the explanation of laws we require

$$A = \left\{ \begin{array}{c} \alpha - \gamma \\ \beta - \delta \end{array} \right\} = B$$

Thus the whole arrangement of explanation is really different. If in a way we are classifying laws, we are not attempting to bring them all under one genus, but to reduce them to a *series* or system of elements which shall in turn be mutually connected. A multiplicity or system, not a single generic concept, must stand at the head of our explanatory table.

The truth is, that classification, however deep it goes, does not get beyond the analysis of general attributes. It does not treat the universal laws as such, whereas it is precisely with the universal that explanation deals. The ideal of classification is to exhibit the whole network of resemblances and differences in a mass of general attributes; and natural classification further shows how a certain constant type of difference runs through the whole. But it nowhere states on what conditions those differences arise. It does not enter into their antecedents. It does not deal with them as sequences. This is the business of explanation, which in its crudest form takes the laws of sequence and treats them like classification, bringing them always under higher universals, but which soon learns that here too the classifying work is superficial and preparatory, and that only in the connected system of universals can you find ground for difference as well as resemblance.

The classificatory ideal could only amount to explanation if the universal, and that the abstract universal, contained in itself the ground of its differences. But this is impossible; for though a content A might determine itself in the direction α A to form X, it is absurd to assign to the very same

content, apart from all foreign reasons, a self-determination in the quite different direction βA to form Y. If contents were self-determining only, we should have no hierarchy of universals.

The illusion of the universal determining its own differences is fostered by the present state of biology, in which classification has played an important part as leading to explanation. That this should happen is no matter for surprise. If you find a single differentia, or a set of differentiae united on some single principle running through a complex set of facts, you are already on the traces of the cause of that differentia. What will cause that differentia in one case will cause it in others. And thus, when a peculiar synthesis of relations of resemblance and difference is already attributed in certain cases to inheritance, and when a corresponding synthesis is found to unite all members of the organic world, it is an easy step, comparatively speaking, to extend the area of the cause also, and infer that the actual species of the organic world are related by and owe their present existence and character to inheritance. At this point classification passes into explanation—not explanation of the laws of action of inheritance (that is still to seek), but explanation of this vast system of concrete fact which we call the organic world. And in this explanatory system certain organisms, protozoa, take the place at the head occupied in a classification proper by the abstract notion organism. But this change marks the transition from the one operation to the other, and should not lead to a confusion between the two. The protozoon is not an abstraction like "organism," pervading the whole field of facts ranged beneath it; it is a definite concrete creature living under conditions of its own. You cannot call a horse or a man a protozoon as you can call them organism, a vertebrate, a mammal. Precisely, when we come to the antecedent (real or alleged) of our mass of facts, then we part from the idea of the genus or generic character that merely pervades them. Nor even so is the protozoon itself, and as such, responsible for the variety of creation; but the differences thereof are on any evolution hypothesis due either to the response of its descendants to difference of environment, or to the intermingling of different protozoic, and subsequently metazoic, individuals. To talk, therefore, of an amoeba as an organism in the abstract is a logical mistake; to suppose that such an abstract organism develops itself independently into the variety of the animal and vegetable kingdom is an error at once in logic and in biology.

On the one hand, then, the processes of classifying and explaining remain distinct. At the same time the present discussion will have given us some insight into the logical value of the distinction between natural and artificial systems of classifying. Both these systems rest on a single principle or connected set of principles. That is to say, they endeavour to arrange all their facts on a single method. Both therefore are subsumptive. But the most consistent and complete application of a single principle may take us very far from any arrangement that we should call "natural." A dictionary, for instance, supplies us with an example of an arrangement of words superior for its own purposes to any other, and superior just in this, that it carries out an extremely simple plan of arrangement over all the tens of thousands of words which form a language. But "natural," in the sense that by its arrangement it throws any light on the structure, origin, or use of language, it is not. If, on the other hand, we can find a principle (or connected set of principles) of differentiation which can be thought of as an actual form of change which the objects in view may undergo, then that principle would explain the genesis of the variety of these objects from a generic type. And from the classification to the actual explanation there is here only the step—though it is a great step—of verifying the principle of differentiation as an actually operating law of change. A subsumptive classification, then, becomes "natural" when the principle which it employs is that on which the genesis of the forms actually depends; otherwise it is "artificial."

Briefly to sum up. In classifying we deal with general attributes and their relations; in explaining, with universal laws and their relations. Thus in classifying we describe what is; in explaining, what must be, and why it must be: in classifying, we do not look for antecedents; in explaining, we so analyse the antecedent as to show ground for the consequent: in classifying, our ideal is to bring our contents under a *summum genus* by some fixed principles of differentiation; in explaining, it is to resolve complex laws into elements which are themselves connected. But though classifying and explaining may never be the same, the first is the true step to the second, in that in laying down resemblance it presumes identity of causation, and in pointing out differences it sets the problem of discovering reasons why; while lastly, in identifying differences it indicates the solution which would cover in one explanation its total field of facts.

To conclude. The ideal of knowledge, as we understand it,

is to reduce the mass of facts with which it deals to an orderly and intelligible system. In this system every element, whether a particular fact or a general law, would be "explained" by its relation to the system as a whole; the whole itself would not be explained as depending on anything outside itself, but would be intelligible as a system of related elements. The "explanation" on which such a system would rest is not to be identified with any kind of classification, but is a distinct method of systematisation: in detail, the particular fact is "explained" by reference to the ground from which it flows in accordance with a uniform law; derivative laws are explained by analysis into their elements, and elementary laws by correlation, through their resemblances and differences, with one another. The ideal of explanation in this direction is to reduce all simple laws to a form in which they follow directly from the principles of reasoning and of construction.

So far we have found no difficulty in forming an ideal of the totality of knowledge, however remote that ideal may be from any chance of realisation. But another point gave us greater difficulty. A necessary preliminary to explanation is the reduction of all particular facts to universal laws, and here we found a theoretical obstacle in the element of variability. It is clear that if the ideal of explanation is to be realised, this difficulty must be dealt with. How far in dealing with it we are forced to modify our ideal, and to what conception of knowledge as a totality we are finally led, are questions which must be taken up again at a later stage.

CHAPTER XX

SUMMARY OF THE THEORY OF INFERENCE

WE have now to bring together the main lines of argument in the preceding chapters, and to indicate the broad conclusions as to the nature, results, and postulates of inference which emerge therefrom. Broadly, we may say that the function of thought in inference is to connect the given, with the result of extending its knowledge over the wider reality which is not given. In the act of inference thought takes the actual relation as also a necessary relation, and as a fragment of a system of necessary relations. In this function thought has no system ready made, no criterion of necessity lying at hand to apply. It learns the concrete character of the system from the facts themselves, and hence by slow and laborious degrees with constant mistakes. Its only postulate is that there is a system; there are relations which are necessary. What the system is it must find out from the facts themselves.

Thought, then, in the act of inference, imputes connection or necessary relation to given facts. What now is the nature and meaning of this connection, and by what are we guided in applying it? To this question objection may be taken. We must first ask, it may be said, whether there is any guiding principle at all before we determine what the principle is. It may be that thought is guided, as it were, by an instinct of its own which is incapable of analysis, or, if the notion of instinct be rejected as proving too much and explaining too little, it may be that thought has many methods of dealing with the infinitely various facts of experience; that no single principle, nor any assignable set of principles, would be applicable to them all. In short, it may be said, we work with methods that defy, perhaps rise above, analysis. We must be content to point out the fact that as reasoners we do connect and systematise, we do attribute necessity, but we must not expect to find any clear and absolutely certain criteria by which these operations are carried on.

This negative account of the matter may or may not be true. But it can be proved only by showing the actual failure of all attempts at systematising the operations of the mind in inference. What is certain is that the analyses of logic are at their best an inadequate attempt to render articulately, and, from the nature of the case, in abstract terms, that which thought executes unconsciously and in the concrete. The utmost, therefore, which can be hoped of any analysis like the preceding is that it may form a ground-plan on which subsequent reflection, by adding this and subtracting that, may approximate to a true reconstruction of the inferential process.

We have attempted, then, to correlate the operations of inference by exhibiting them as based on a connected series of principles. Starting from the characteristic endeavour of inference, to extend our knowledge from the given to what is beyond, we found that a single type of consideration is appealed to when we argue, whether with certainty or probability, viz. parallel experience, and that if the argument is to be held sound and certain this experience must be, so far as we know, uniform, unbroken by an exception. We next saw that arguments of this kind could be applied in opposite ways, since it was always possible for the concomitants of any given relation to "make a difference." But we inferred that if the concomitants were taken into account, and no ground for a difference was to be found in them, the conclusion must be taken as certain. And here was a broad justification for ordinary common-sense inferences from uncontradicted experience, on which our ordinary everyday certainty may be taken to depend. And such certainty, we have since found, is only not justified in theory because of the complexity of the factors which may in the end modify a uniformity that has been long maintained, while it does in the main meet with practical success owing to the width of the experience which, for reasons shown, in some degree compensates for incompleteness of observation and analysis.

From this principle of inference, which appeared at first as a mere guide for our own judgments, we were driven to infer a general principle of connection between the elements of reality themselves. For our principle would, under certain circumstances, have proved false unless we assumed that every change in the order of events had its ground in other facts ultimately discoverable by us. From this we could infer the simple statement that every fact has its universal ground. And here we reached a point whence, as we may now make clear, we might equally well have started in order to deduce the positions previously taken up. For assuming that every fact has its ground,

it would be clear that any given relation would be universal unless there were some change in the concomitants as a ground for the difference. From this, again, it would result that the only consideration used in inference would be the points of likeness and difference to parallel cases. For it must be a point of likeness in the antecedent which should determine likeness in the consequent, and a point of difference which should be a motive to the denial of that result; so that, if we admit the axiom as expressing what it is reasonable to take into account in generalising, we must admit these to be the considerations, and the only considerations, by which we are guided. At this point, then, the series of principles so far formulated, though each in itself a distinct point, has come full circle. We can start at either end and deduce the remainder. If either the first or last is true, then all are true. This is important, because we do not claim self-evidence for any one of them. We "assume" them because they seem to express the action of thought in different phases or at different points. And if the analysis is correct, and we are able to connect these principles as above, we may claim at the same time to have interconnected the various modes in which thought operates.

Dealing next with the manner in which these principles are applied in inference, we argued that certain further positions must be deduced to bring principles and facts into relation. The chief of these were—(1) that the same ground has as such always the same consequent, however much this may be disguised by the concomitant operation of other factors; (2) that, so far as we are considering events in time and space, we must assume ground and consequent, or, as we should here call them, cause and effect, to be continuous; while (3) in the last chapter we have seen that every event must have an universal correlate among its temporal antecedents, i.e. a cause in the usual sense. These positions, we argued, followed from the axioms originally assumed.

Applying our principles next to the foundation of probable reasoning, we argued that since it is better to be nearly right than always wrong, it is well to know what will happen most often if you cannot know what will happen always, and that on such knowledge, if attainable, a probable conclusion could be logically founded. Applying our reasoning, then, to the facts of frequency, we found that these too must have their ground, and that ultimately this must be looked for in the degree of connection between the conjoined phenomena. Whence arose a converse argument from given frequency of conjunction to degree of connection.

Lastly, we urged that if in our experience we could find no argument certain or probable with even the lowest degree of probability for a suggestion, that suggestion must be taken as logically worthless and without effect, while, so far as it should suggest a difference in the order of reality as inferred from observation, it must even be directly denied, since the result of induction is exclusive of difference in the sequences of facts, just in proportion as it affirms uniformity. From these results we formed a general conception of the way in which generalisations are established. That which depends on uniform experience is probable in proportion to the weakness of the considerations that can be urged against it, and when these considerations fall to zero must be taken as logically certain.

Applying this conception, we considered first the methods of observing sequences without regard to their concomitants, and we saw that from them some kind of connection could be inferred, but that there was no means of telling whether that connection were direct and so strictly universal, or indirect and so dependent on other conditions. For practical purpose such inferences could be applied, in circumstances not notably different from those from which the premisses were derived, with a probability proportionate to the number and extent of these premisses. We passed from them to inferences from the nature of the content and its concomitants, and argued, first, that the mere existence of an unchanging content gave ground for expecting its continuance; secondly, that when a single change in the temporal antecedents is followed by a change in the consequent there is a very high probability that the first is a part of the cause of the second; while, thirdly, if we find a similar sequence of changes in totally different surroundings, it is highly probable that the first fact contains the whole ground of the second.

The results so far gave us a high probability for the required generalisations. This was increased when we found results independently arrived at corroborating one another by forming a nexus of interdependent judgments. We urged that there is no motive in experience for suggesting such a concatenation of chances as would cause fundamental error in such a case, and that accordingly a systematised body of inductive results must be taken as certain.

We passed next to the consideration of a special class of generalisations embodied conspicuously in mathematical sciences, and more sporadically (if we may use the expression) in other maxims and modes of thought. We found that these results could be reached in any concrete case by an act of analysis and construction, and the problem reduced itself to

the question why the results of these acts could be generalised without the processes of elimination necessary in other cases. We found here a distinct postulate of thought in addition to those employed already in inference—the postulate that the processes on which the judgment rests is valid. This process involves that the data used in construction and analysis should be in themselves a sufficient ground for the results based on them. And from this it followed at once by our axioms that the results so reached can be generalised without more ado.

We turned finally to the question whether the inductive process led to anything like an "understanding" of nature as distinct from the "calculation" of its course. We found that explanation involved a resolution of laws of sequence into simpler elements, determining the wholes by principles of construction, and interrelated with one another by laws of variation. We saw reason also to suggest an ultimate type to which explanation might reduce these primitive laws, that, namely, of continuity of content. In this form of sequence we urged that the content by its own nature contained a ground for its result, and that this relation is that which we strictly mean by one that is in itself and of itself intelligible. We thus found an ideal for what we called "mechanical" explanation, leaving it an open question whether other ideals of explanation might not be justifiable.

Our theory, it will be observed, has two main features. On the one hand a number of principles are postulated as necessary to the work of thought; on the other an attempt is made to connect all these principles so as to reduce them in effect to a single assumption with which the whole work of thought will stand or fall. Such a theory is clearly liable to error in either point. For, first, it may form an incorrect conception of some or all the several postulates involved in the various methods which thought uses. It may assume some that are not necessary, or leave out of account some that are essential. And, secondly, it may err in its method of connecting the positions assumed. The connections may be illusory or incorrect. To a theory, then, which does not claim self-evidence for its assumptions, nor the accuracy of omniscience for its deductions, a word should be added as to the grounds on which it rests and on which it must be modified, if modification should prove necessary.

The position, then, of the preceding chapters has been that the validity of an axiom depends on the fact that it is logically implied by some activity of thought the results of which are not contradicted by experience; that is to say, that if the

axiom be true, that activity will give good results, and if not, not. Granting, then, as the result of a first analysis of scientific operations that we have such a method as, for example, the method of difference, the canon of that method acquires a claim to be axiomatic. That this claim is not final we shall see at a later stage, but we take it as final for our present purposes. That is, as logicians *assuming the validity of thought in general*, we have only to find a principle on which some operation of thinking rests, and we are bound, if the results of such operations are not contradicted by experience, to take that principle as for our purposes good. In this way, then, we obtain one by one the series of principles above explained, the law of the ground, the law of chances, the principle of continuity, and so forth. Apart, then, altogether from this interconnection, these principles claim a certain validity of their own, and they would stand on that ground if every argument by which we have sought to connect them were destroyed. Again, any law directly deducible from these principles must be held true although not directly implied in the work of thought. While, conversely, any law claiming to be axiomatic and appearing self-evident, which cannot be shown to be implied by reasoning, loses all claim on our assent. We saw some reason to think that this was the case with the doctrine of the unity of causation in its extreme form. It becomes, therefore, a matter of great importance to make sure what assumptions, what minimum of assumptions, will explain the work of thought. By "explaining" I mean here, stating precisely what must hold true if the results of thought are to hold good. If we possess accurate knowledge on this point we shall have to discard any other principle, however plausible, as non-axiomatic in character.

Our aim, then, has been to examine the broad fact that reason works by connecting and systematising; to analyse the method by which these connections are formed; and by reducing them to common principles to connect these methods themselves. The logical basis of this whole process is not the first principle to which we lead up, but the actual work of thought from which we start and to which we return. Our postulate throughout is that thought is valid; and that postulate would remain if our analysis of the detailed character of the principles of reasoning were riddled with disproof from beginning to end. But this postulate is for the present an assumption which must not be left unchallenged. The problem of its grounds and justification is the final question for the theory of knowledge on which we have now to enter.

PART III



KNOWLEDGE



CHAPTER I

VALIDITY

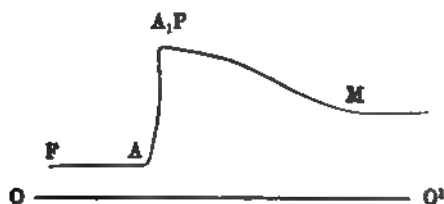
WE have now given what account we could of the structure of knowledge in its higher and lower forms. We have shown that it rests upon a certain limited number of presuppositions, some of which, called collectively the inductive principles, have been stated as universal truths holding of reality at large, while others, such as memory or construction, may be looked on as powers or faculties of the mind which forms and possesses knowledge, and are for our inquiry ultimate facts, since any attempt to explain their origin or character postulates at the outset their general trustworthiness. In the progress of our inquiry we have had at several points to distinguish between truth and falsity, and between valid or invalid methods of forming assertions. And we have so far assumed, without hesitation or self-criticism, that every assertion which issues from one or several of these presuppositions, and from no others, is valid, and is to be taken as true. But now that our survey is complete, a deeper question naturally suggests itself. Having admitted the possibility of error, it may be asked, Why, after all, should we take these half-dozen methods (as we may call them generically) of forming our assertions as especially valid? We have used them, one and all, for testing various judgments; but what shall test them? Or have they an inherent right to stand untested? If we are not to leave this question unanswered, we must get some notion of what validity means, and what sort of test can be assigned for it compatibly with the limits of the human intellect.

There are here two questions, and we will begin with the first. We will try to show first what validity means, and then consider the tests or guarantees of the validity of our knowledge which have actually been proposed by various schools of thought.

1. The notion of validity may be regarded as a generic concept, including one that is more specific and more easily recognisable,

and from which we will therefore begin. The notion of truth and falsity has underlain the whole of our previous discussion; and though we cannot do much in the way of analysing this notion, we may say a word or two as to its genesis. The idea of truth and its opposite appears to be the result of a comparative judgment, just like other ideas. I have in my mind a formed judgment that A is B. I observe A, and find that it is B. Then, if I happen to form a construction of the judgment already present and the apprehended relation now presented, I find a particular relation between them which I express by the word "correspondence"; and when judgment and the given correspond, the judgment is said to be true. This relation of correspondence is not precisely one of similarity or identity, and much confusion has been caused by expressly or implicitly treating it as such. For the judgment is a mental event, and the content apprehended not necessarily such, so that they may not be *in pars materia*; while, if we abstract the judgment from its content and regard the content as similar to the given, we are again open to the objection that the given (seeing that the judgment is true) is precisely the very thing which it asserts—is not therefore similar, but identical, with the content of the judgment. One assertion, then, is true according to another if the content which they assert is identical.

Now, antecedently to the supposed comparison, the judgment A-B is a psychical fact having a certain degree of psychical *force*. That is to say, it is held with greater or less tenacity, with absolute conviction, with certainty, with "tolerable" sureness, with strong belief, with some hesitation, as the more likely of two alternatives, and so on. There is, as we have already argued, every degree of "force" in an assertion, from absolute conviction down to the merest suggestion. In case of a correspondence with the given, a judgment is confirmed, and—whatever its strength previously—it rises for a moment to the maximum of certainty, from which it only descends very slowly as it becomes memory and fades into the distance of the past. We might represent its fluctuations of strength somehow thus



where O O' is the zero of belief, F is the period before apprehension, A marks the beginning of apprehension, A_1 its completion, P the short time of primary memory (transitional in character between apprehension and memory), and M the period in which it has settled into the groove of memory, and takes its place among other memory-judgments. The line from A to A_1 is not drawn perpendicularly, since both apprehension and the judgment of correspondence must, as psychological facts, occupy a short time, however much time may be irrelevant to the content of the latter. If, in another case, apprehension contradicts the judgment, the upper line would sink after the point A to the level of the lower; the strength of the antecedent judgment would fall to zero.

2. The notion of truth and falsity therefore supposes a special mental power (already alluded to in dealing with inference) of criticising and "correcting" our own judgments. The criticism, indeed, we have seen to follow from the ordinary methods of construction and comparison. But the correction is a further peculiarity which means in essentials this—that the intrinsic force of any judgment, its command over our minds, can be modified, raised, or lowered, as the case may be. So far we have only considered extreme cases of such modification, the definite and complete reversal or confirmation of a judgment by the given content which is fact. But just as we compare judgment with apprehension, so we may compare judgment with judgment. On one set of grounds I may assert $A - B$, while a different set of considerations leads me to deny it. Here, then, is a conflict of judgments in which more than one alternative is possible. One judgment may amount to conviction; it may be so strong as to be indistinguishable in its force from the certainty of apprehension, while the other is weak. In that case the result is scarcely different from that already described. This is the simplest case; but starting from it we may have any degree of relative certainty in either or both of our judgments; and if, for purposes of illustration, we assume this felt certainty to operate fully, and to be the sole psychical force acting, then in accordance with this ratio will be the resulting attitude of mind. Thus, if the affirmative judgment has the force m and the negative n , the result will be a judgment m minus n ,—affirming if m is greater than n , denying if n is greater than m , and resulting in pure doubt if the two forces are equal. The modification of a judgment's force, or value, is then dependent on other judgments with which it is brought into contact, that is to say, which make an assertion about the same content. Now, apart from the question of

precise measure, here we have at least a general conception of validity. Every judgment as such has its own degree of force or value. Its validity is simply its corrected value. This correction, we have seen, may be made by a comparison with an act of apprehension or with another judgment. It may, as we shall afterwards see more fully, be final and complete, or temporary and partial; but, in any case, it is a value deliberately assigned to the judgment by the reflecting consciousness, not determined wholly, though in part it may be, by the original value of the judgment itself. Such is the general notion and such the postulates of validity, and the important philosophical question with regard to it is whether there is any final validity, any ultimate value, attaching to a judgment that can need no further correction: and, if so, what is its standard, and how is it known?

3. We shall deal presently with suggested answers to this ultimate question. But we must notice first a special application of the conception of validity which leads to some of the most peculiar difficulties of the question. I mean the application of the idea to the methods whereby a judgment is formed. For the purposes of this chapter the term method may be used in an extended sense, as embracing any or all of the conditions on which a judgment rests. Thus we may speak not only of inductive or deductive methods, but of the method of memory, of construction, of analysis, or of the union of several or all of these.

Now, as to the idea of a valid method there is no very great difficulty. A method is valid which gives valid results, and only valid results. I "trust" my memory because it has never deceived me; or I trust it in such and such particulars, for such and such a period, when its contents are of such a degree of clearness,—because for those particulars, for that period, with that clearness, it never deceives me. In short, given that I can compare the resulting judgment with the facts, and that I can also be aware (by immediate introspection or by a synthesis of memories) of the steps by which I arrived at that judgment, I infer that those steps led me to truth. In a parallel way, other mental operations are convicted of resulting in error. Hence the first are accepted as sound or valid methods, and the second dismissed as invalid and misleading.

Now, as an account of what is or has been, this is all very well. But especially with regard to our methods of ascertaining truth we wish to extend our inference to the future and the unknown. Suppose, then, I see that a method has led me

to true results, how am I further to be sure that it always will do so? If, on the ground that it has been valid, I extend its value prospectively, that is an inference, a generalisation; and how is that generalisation in turn to be guaranteed? We move here in a circle. Had I already attained the totality of knowledge, if I knew "whatever there is to know," and knew that I knew it, I should be able *a posteriori* to dissect out all the methods which had led me to knowledge, to distinguish them from those which had been paths of error, to name the first valid and the second invalid, and that with no limitation to any particular sphere or period of experience. But it is just because we are not as gods, knowing the whole of things, that the question of validity arises. And it is by means of the methods that we have that we hope to attain more knowledge or test the knowledge we possess. Hence the circle: our methods create and test our knowledge, while it is only attained knowledge that can test them. From this circle what escape can there be? Is there, after all, any final and genuine test of truth, or is validity a purely relative term, denoting at best the *de facto* action of one judgment on another without expressing any result which we "must" or, as "reasonable" beings, "ought" to accept? This is the deepest question of philosophy. Let us consider briefly the general character of the answers returned to it by different schools of philosophy.

4. (a) Scepticism occupies two rather different attitudes to the present question, according to the general state of the sceptic's mind. Thus we may have on this point a purely philosophic scepticism, which amounts in fact to the theory of not having a theory. There is and can be no rational or scientific answer to this question. There are some beliefs which we accept and others which we are comparatively ready to reject. When beliefs clash, one normally extirpates the other, or perhaps we are left in doubt. That is as the case may be. The whole question is one of pure fact. There is no right or wrong in beliefs. If these names are used at all, they can only have meaning as applied *ex post facto* to the beliefs which we finally accept. All this may be compatible with a practical acceptance of felt certainty—indeed, it tends to that attitude. What is felt to be certain, is certain, is true, is reasonable; for what meaning else can we attach to those words? Hence philosophic scepticism may be robustly practical in life, and must be distinguished from what we may call practical scepticism, which is also a not unknown phenomenon.

The practical sceptic is only in partial agreement with the philosophic; for though he denies the possibility, or at any rate

Lastly, we urged that if in our experience we could find no argument certain or probable with even the lowest degree of probability for a suggestion, that suggestion must be taken as logically worthless and without effect; while, so far as it should suggest a difference in the order of reality as inferred from observation, it must even be directly denied, since the result of induction is exclusive of difference in the sequences of facts, just in proportion as it affirms uniformity. From these results we formed a general conception of the way in which generalisations are established. That which depends on uniform experience is probable in proportion to the weakness of the considerations that can be urged against it, and when these considerations fall to zero must be taken as logically certain.

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the question why the results of these acts could be generalised without the processes of elimination necessary in other cases. We found here a distinct postulate of thought in addition to those employed already in inference—the postulate that the processes on which the judgment rests is valid. This process involves that the data used in construction and analysis should be in themselves a sufficient ground for the results based on them. And from this it followed at once by our axioms that the results so reached can be generalised without more ado.

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Our theory, it will be observed, has two main features. On the one hand a number of principles are postulated as necessary to the work of thought; on the other an attempt is made to connect all these principles so as to reduce them in effect to a single assumption with which the whole work of thought will stand or fall. Such a theory is clearly liable to error in either point. For, first, it may form an incorrect conception of some or all the several postulates involved in the various methods which thought uses. It may assume some that are not necessary, or leave out of account some that are essential. And, secondly, it may err in its method of connecting the positions assumed. The connections may be illusory or incorrect. To a theory, then, which does not claim self-evidence for its assumptions, nor the accuracy of omniscience for its deductions, a word should be added as to the grounds on which it rests and on which it must be modified, if modification should prove necessary.

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which would not fit under one of these categories
be capable of entering into any intellectual
relation to man's world. It conversely, that
certain natural conditions are prescribed when
the understanding itself conditions experience
and is primary to concepts from objects. It
is a case of conditions of their becoming possible
and hence the universality of the categories
must not that could not be a part of or element
of what they should not apply. Thus the
universality claim.

Intuition and Cognition

But it was impossible to stop here. I
continued. There is more that there is, an
infinite material of experience upon which
objects are placed in groups under its power
of laws. I mean that the mind really forms
order of what it is aware in knowledge. I
do not after some reflecting and an insight
of the other categories. Ideas of laws, but
it is what seems an essential element in
cognition to make the best of. This element
part of the knowledge must belong to the
mind as the categories. And only so far
as the categories are in. But the point
is a whole. It suggests my reality in
nature is that the categories are applicable
and that which all world of experience
is not possible for their applicability of certain
laws. The universality regarding the un-

with some other data in one act of consciousness. I must make a synthesis which forms different objects into one. This is the action of the synthetic unity of consciousness.

But now I can only make synthesis upon certain definite principles, or (if you prefer it) by means of certain definite conceptions; these are the various conceptions which each several form of judgment is found to imply. Hence an object which should not fall under one of these categories would not be capable of entering into any intellectual synthesis at all. It would be unknowable; or conversely, that an object may be known, certain conditions are prescribed which it must fulfil. The understanding itself conditions experience; it does not learn its primitive conceptions from objects, but imposes them on objects as conditions of their becoming parts of its world. And hence the universality of the categories in experience is clear; for that could not be a part of, or element in, experience to which they should not apply. Thus the truly *a priori* is universally valid.

(c) Relativism and Idealism.

But it was impossible to stop here, for the position is ambiguous. Does it mean that there is, after all, a kind of unformed material of experience upon which the synthesising intellect acts, which it groups under its primitive categories; or does it mean that the mind really forms or constitutes the order of which it is aware in knowledge? The first alternative, adopted after some vacillation and ambiguity by the originator of the whole conception, leads to great difficulties. For, after all, it would seem, an essential element in reality is given to thought to make the best of. This element, in order to become part of our knowledge, must submit to the conditions of synthesis, that is, to the categories. And only so far as it submits can we know anything about it. But this proves nothing of reality as a whole. For suppose any reality to be of such a character that the categories are inapplicable to it, it will simply stand outside our world of experience, a background always possible yet never capable of certain affirmation or denial. By consistently regarding the understanding as a synthetic activity, and admitting that it must synthesise *something*, Kant was driven to the conception of this background of reality, and the consequent limitation of knowledge to the field of our own representations as constituted and determined by the categories. But now it is clear that we have not gained much. For anyone having got to some notion of the fundamental activities of the mind could surely say that they are applicable and valid in their own sphere, that is, so

far as they apply. The question really is, How far do they apply? and here, if Kant's answer is not tautological, it is only because he confines knowledge rigidly to a world of phenomena or representations, with the consciousness all the time that there may be another world that must remain for ever unknown. This is a heavy price to pay for the necessity of the categories within the world of experience. It would be surely better to feel that if our views and modes of thought are of limited validity, a wider experience can correct and supplement them. Nor, lastly, is it seriously a possible view even as it stands. For if the material of experience be genuinely regarded as a conditioning element, and if nothing can be known as to the applicability of our conceptions thereto, it cannot logically be maintained that the regularity of our own world of experience is not threatened thereby. If we are to conceive a world of things in themselves as even possible, and if we are to think of them as supplying the material of sensation (and this was in the end Kant's view), then the order—at least in some respects—of experienced sensation must, if only in the most partial way, depend on the character of these things. Now, so far as our experience has hitherto gone at any time, the material supplied thereby may have been such as our conceptions could unify and harmonise; but that it will always be so is a sheer inference, primarily, no doubt, about our experience, but secondarily concerning those things in themselves concerning which we can *ex hypothesi* make no inference at all.

To this alternative Kant was led (as we have seen) by considering what was implied in the idea of synthesis. There must be something to synthesise: this something was the manifold of sensation; and its origin was ultimately the thing in itself. When this led to manifold difficulties, and even contradictions, another alternative coquetted with by Kant himself was adopted. This was to deny the existence of any material on which the mind should work. The mind is no longer, from Fichte onwards, to work on a material; it is to work out a material. We have already learnt from Kant that the understanding makes nature, but we have to apply this principle in a more thoroughgoing way. The alleged *sensendum* on which intelligence acts is found to be a mere abstraction apart from the relations which the Kantian admits to be the work of intelligence. No line can be drawn between the *a priori* and the *a posteriori*; and as a result, not a part only, but the whole of nature is the product of intelligence.

Merely as a theory of validity much might be said for this view. There would, indeed, still be difficulties. For example,

granting that mind is all things, or that all things constitute the full concrete realisation of mind, we may still ask, Does mind at any stage know itself fully? There seems every reason to deny this and none to assert it, since the very existence of philosophical controversy shows the difficulty men have in analysing their own conceptions. And, indeed, the most influential, and perhaps the most philosophic, system of idealism aimed specially at exhibiting mental development as a "dialectic" in which the lower point of view is continually, and in virtue of its limitations and consequent contradictions, being merged in a higher. But what we want to know is the degree of truth in our own point of view, in the body of scientific opinion which we take for truth, and in the principles on which that science rests. Our question is not whether these opinions are a phase of mental development, which, indeed, is intrinsically obvious, but whether as they stand they are in whole or part final. The universal consciousness or the self-conscious idea may know all this, but since we are not the universal consciousness we know no more than before.

But supposing difficulties of this kind, which may be admitted to be of minor importance, to be surmounted, the graver question would remain, whether idealism is consistent with the facts of our experience and the principles of our intelligence. After all, even idealism requires some proof. We cannot begin, continue, and end in assumption; and the question is, whether some of the essential assumptions of this system do not break down when tested by the facts. I may illustrate this by a brief reference to two main lines of argument on which different forms of what we may broadly call idealistic theory have rested. One of these is the alleged dependence of sensation on thought. We have already discussed this in Pt. I. Chap. I., and seen reasons for rejecting the idealist doctrine. We will here only add this remark, which seems in some degree to give the ground of error. Kant held to the *a priori* character of the forms of sense and the concepts of the understanding on two essential grounds. The first was the inadequacy of sense-data as conceived by Hume himself to furnish these conceptions. The second was the necessity and universality of mathematical and (generally) axiomatic truth as opposed to empirical truth. Both these grounds are abandoned by the idealist. The first because it is admitted and insisted (quite rightly) that the spaceless, timeless, relationless sense-datum is a figment: it is an abstraction from the concrete whole of which we have actual ex-

perience, which has duration, which stands in uniform relations and so forth. The second, because according to the truer conception of sense experience, all truth when fully understood is necessary. There is no longer a distinction of empirical and *à priori*, for all is *à priori*, though not all is completely worked out and elaborated.

But in both these developments of Kant the idealists have cut the ground from beneath Kant's feet and their own. If the "given" element and the "work of the mind" in the contents of observation are indistinguishable, it is as easy to contend that all is "given" as that all is formed by the understanding; and if (as empiricists have always contended) the distinction of *à priori* and empirical truth is relative and contingent, we can as easily infer that none is *à priori* as that all is so. In short, Kant reintroduced the work of the mind to cover certain deficiencies in observation and explain certain distinctions in knowledge. Idealism denies both the deficiencies and the distinctions, and therefrom infers, not that the work of the mind is nil, but that it is all. A curious inference; the real fact, as it appears, being that idealism has extended Kant's conceptions while annulling his

Another line of thought leading to a more ambitious form of idealistic doctrine ran roughly as follows:—Any one of the ordinary conceptions which we take as true will turn out, if we seriously examine it, to be an inadequate expression of reality. It is more than this; it is, if asserted without qualification, a sheer self-contradiction—so much so that in endeavouring to assert it we find ourselves asserting just its opposite. Being, taken bare and naked as mere being, turns out to be nothing at all, mere Nothing. But Nothing, again, cannot stand investigation. We are forced on further to a fresh conception which will include both these illusory notions. But our new hope turns out deceptive. The definite being (for example) which we have now reached is equally, when we try to grasp it, a bruised reed, and we are forced on again and again. So the process repeats itself, as it might at first seem, without end or hope. But this is not altogether so. Each conception that we took up contained some element of truth; for to contradict it was as wrong as to assert it without qualification, and the right way onward was always to find a new conception which should contain the old along with its opposite, only as merged in a higher whole. And this gives us hope of an ultimate conception which shall contain within itself all possible elements, each in its proper place, with its

own amount of truth, and this absolute idea would be the whole and the true.

With regard to this conception there are two questions to ask. First of all, is it, so far as it goes, correct? Secondly, would it, if correct, give us a criterion of validity? The first point is a question in part of detail in part of method. The principle of the method we have already dealt with.¹ As to the detail the question is this: Do our partial and limited conceptions contradict themselves after this fashion, and force us on to a whole in which they are merged, and which can alone be the real? We have tried to show—in the case, *e.g.*, of immediate consciousness, of space and time, of the relation of subject and attribute, and we shall try to show later of substance, cause, and self—that this is not so, that these conceptions properly understood have an intelligible and self-consistent meaning, and that the inconsistency lies always in a false way of representing them. And in general we may add, that falsity consists in an alternative exaggeration, first of this side of the conception and then of that. If we dress, for instance, the unity of the thing so as to make it the whole character of the thing, its plurality disappears; and then the unity in turn contradicts itself because it is twisted into a featureless abstraction. Then accentuate the plurality in the same way and unity can nowhere be found. In short, conceive unity and plurality as they are *not*, and you can easily show them to be unreal. Conceive them as they are given, and you no longer find them irreconcilable. In a sense, it might be said, this is Hegel's own aim. No thinker, so far as I am aware, before him gave so clear an emphasis to the statement that "the truth is the whole," nor waged so vigorous a warfare against the mass of abstractions that constantly threaten to suck the life-blood of philosophy. So far as Hegel's work went to exhibit the inherent weakness of abstraction and to force the overdone abstraction to submerge itself in the truer life of the concrete, his achievement cannot be too highly rated. But here all seems to depend on the correct or incorrect formation of the concept, and on its reference with or without due limitations to reality; and it has been a principal aim of the preceding chapters to argue that the conceptions of science and common sense can be correctly formed and legitimately applied, and that not as mere elements of uncertain value merged in a higher concept, but as actual expressions each of some part of the truth.

The result, then, would be that we are not forced on by any

¹ Above, Pt. II. Chap. II.

dialectical movement to a supreme thought which includes all reality. Nor are we bound to know everything before we can begin to know anything. An ideal this thought doubtless is, and as such legitimate; but as an ideal it can have no bearing on our present question—how we are to find anything which will give us confidence in the validity of our beliefs. We cannot be the supreme thought, nor therefore, if we imagine it, can we know that we have framed it rightly merely because it is the supreme thought that we have imagined. To make the absolute idea in this way its own evidence would be to revive the ontological proof.

This will be clearer if we consider the one claim on our allegiance which the supposed all-inclusive conception may make. Other conceptions, it may be said, contradict themselves. This alone is self-consistent, and therefore true. This brings us to the question of the principle of contradiction as the test of truth.¹ Now, that this principle is a negative test no one I imagine denies. What is real cannot contradict itself, whatever else it may do. And we need not combat the view that this statement attributes some positive quality, however meagre, to the real. What we must entirely deny is, the power of going beyond this meagre qualification on the strength merely of the principle before us. We may put our objection in two ways. A certain suggestion² does not contradict itself. It is therefore true. But there might be a hundred other suggestions which I might make and which would all alike be self-consistent, though any one of them might be incompatible with the first. Mere self-consistency is not proof. It is simply the first condition which a suggestion must satisfy before it is worth while to consider whether proof exists.

The application of the principle, in fact, becomes plausible only when there is an apparent restriction of our choice to two alternatives (e.g. unity or plurality in Mr. Bradley's argument). Then, if one of these involves a contradiction, and if the restriction is real, the result follows. But both of these points must be known *ab extra*. That reality must be one or many is a disjunction inferred from the alternatives with which ordinary phenomena present us, and it might be questioned whether the inference is legitimate; it might be suggested that the whole would not have any attribute applied to it derived from a part.

¹ As suggested by Mr. Bradley *Appearance and Reality*, bk. ii. chaps. xiii. and xiv.

² Mr. Bradley speaks, not of suggestions or assertions, but of reality as being self-consistent. But it must come to the same thing. The reality as conceived by you or me is what is in question. Is that or is it not self-consistent? My point is, that reality might be conceived without contradiction in more ways than one.

so that reality as a whole would be neither one nor many in the same sense in which the partial facts of our experience are one or many. I am not contending that this is so, I am merely instancing the kind of material considerations to be met before the principle of contradiction will "march" at all as a test of truth. Still more strongly I should insist that the question whether unity or plurality is self-contradictory is one that can only be settled by quite other methods than a bare appeal to this principle.

To put the matter broadly, we may say that while the principle of contradiction is an undoubted axiom, the question, what assertions contradict one another, i.e. what facts are incompatible with one another, can only be answered by a study of reality. This much only can we say on the strength of the bare principle—that the same proposition cannot both be true and not true, if the terms same and true be taken strictly. When from the direct assertion and denial of one and the same judgment we go on to deal with different judgments or with different qualities of reality, the bare principle of contradiction gives us no light whatever. It is a remark (I think) of Lotze, that only experience shows us what qualities can and what cannot be attributed to a body at the same place and time. We can think of a body as at once white and soft, because we have seen and felt snow. We cannot think of it as at once white and blue without the white and blue being both modified into bluish white, because that is the form of union of those qualities which in fact we find in the real world. So, again, the union of the one and the many which Mr. Bradley finds self-contradictory appears to me valid, simply as expressing the nature of the real as I find it. And here the opposition of our criteria comes to a head. For Mr. Bradley would say that such a union, being self-contradictory, proves that in which it is found to be mere appearance; while I should reply that the union in question, being found in reality, is not self-contradictory.

It may be urged, lastly, that the principle of contradiction is an ultimate test. For the false must show its falseness somewhere. If the untrue never were betrayed, how could we ever distinguish truth and falsehood? I will grant this, but I must ask one question—Where will the false reveal itself? In the long run. Well, but how long is the run to be? And if you cannot tell me this, will you justify our confidence in our own knowledge? Our knowledge, you say, does not contradict itself, and if false it would do so. Yes, we may answer; and perhaps it will do so yet. If, finally, you reply that our knowledge is great and comprehensive enough to obviate this fear, we may rejoin

that this is just our question. It is the point on which we wish to assure ourselves.

From the whole line of thought now touched upon we have learnt one great result. In some way or other the whole body of our thought is its own test. If you could get knowledge, or let us say, thought, complete enough you would get it true. The ultimate test is not a principle standing above belief, it is within the system of beliefs itself. Just as the concrete is more real than the abstract, so the whole is more certain than the part. But after our quarrel with the method of idealism we shall have to reach this result by a way of our own, leaving the question of method to be settled point by point as it has already been raised in more than one chapter. Meanwhile we have to consider other possible theories on our present subject.

(d) Empiricism.

In the hands of certain writers the validity of knowledge has been rested upon actual experience. Thus Mill examines the grounds of our belief, not indeed in knowledge as a whole, but in the principle of uniformity which we have agreed with him to be the fundamental principle of inference. Now that Mill's argument cannot stand as he states it, is clear enough, and is I imagine agreed. It is a manifest circle. Uniformity is observed *de facto* in a vast number of cases. Therefore it will be found in all others. Therefore?—why, on what principle? Why should we extend our observations so as to infer from them the future and the unknown? On the principle that the unknown will resemble the known, that is, on the principle of uniformity, loosely stated. In other words, this principle cannot possibly be "proved" without assuming it; and for this there is reason good. For it is the axiom of reasoning, and whatever be the axiom of reasoning is precisely that which we assume when we reason, and is therefore unprovable in the ordinary sense of the word. This is fatal to Mill's argument as it stands; but whether there may not be something more solid in the matter of Mill's argument is another question, not so easily dismissed, to which we shall presently revert.

Analogous to Mill's argument, but, if put crudely, even less satisfactory, is a more recent view which makes success the test of truth. Evolution must have its say everywhere, and so we get a theory of the survival of the fittest opinion. But like bad men, untrue opinions may survive long enough, and may often overcome those which are really better grounded. If you dispute this, you must mean by the survivors those which survive in the long run; and if your argument is to have any weight, the long run must be so very long that I do not know

where it will stop. To put it differently, will the opinion that has succeeded in the past succeed also in the future? If you say yes, that is an inference; and on what is the inference grounded?—on experience of *de facto* success. Then why, pray, infer from past to future?—on the ground of uniformity. Then we are back in Mill's circle, from which we might as well have started.

With all the difficulties that beset both Kant's theory and Mill's, and Hegel's and Mr. Bradley's, they give us a clue which is worth following up. To do so effectively we must return to our conception of validity as a starting-point. From it we shall try to develop a conception of a reasonable criterion of truth, and we shall then ask finally what claim this has on our acceptance and what light it throws on our *de facto* beliefs.

CHAPTER II

THE VALIDITY OF KNOWLEDGE

1. THE criterion of validity is to be arrived at, according to our view, from an analysis of the idea of validity itself and its implications. What these are we have already seen in a general way, and it only remains to show how this conception of validity indicates of itself the nature of the criterion. Validity, then, as we have seen, is assigned to a judgment on the ground of some other judgment. The isolated judgment *qua* isolated may possess a certain force, a felt certainty, but cannot be said to be valid or invalid. Its validity is tested by comparison with some other judgment with which it is in some way connected. But in this it is not implied that the second judgment is of itself necessarily and intrinsically valid. Indeed, such a requirement would itself contradict the notion of validity as just analysed. According to that analysis we cannot anywhere find an isolated judgment of final and intrinsic validity, for the very reason that intrinsic validity as applied to a single judgment is a contradiction. But where, then, can a test—I do not yet say the ultimate test, but any test—be found? From judgment A I appeal to B, and from B to C, and so on; but if C is not valid, why should B be so, and if B is not valid, why A? In short, if validity cannot be found in any one judgment, where is it? We answer, where the conception of validity would have it be, namely, in the consistent judgments themselves, as forming a consistent system. A is judged valid in view of B, B in view of C, C in view of A. Then the three judgments A, B, and C mutually support one another, and this mutual support constitutes their validity. Two mutually supporting or consistent judgments constitute the minimum requirements of validity. If A is such as of itself to lead to B, while B also leads to A, the two judgments A and B are, so far as we confine our view to them, valid. Validity, in short, is to be measured by consistency.

But this validity is only relative. To a consistent or

coherent system A B may enter a third judgment C which is dissident. That is, from C alone we should be led to negate A or B. Assuming for a moment that such dissidence has been overcome (we shall inquire presently in what way that is possible), and that we now have a coherent system again, there would still remain the possibility of any judgment based on some further fact not taken into account turning up to destroy our system. This possibility could only be put out of the way permanently and absolutely if our system took into account every existing or possible fact. The completed system of consistent judgments, then, would possess absolute validity, for there could no longer be any possible judgment to disturb it. This ideal is, of course, unattainable, but meanwhile the highest possible validity would attach to the completely coherent system of all judgments actually existing for us, and taking into account all facts actually known to us. Of our actual knowledge, it has to be asked how far it attains this validity. Or more generally, since validity depends on consistency, and is to be measured by the number of consistent judgments, we may ask what degree of validity does our knowledge or any portion of it attain?

2. This question necessarily arises in view of the actual occurrence of dissident judgments. How are these to be dealt with, and how do they modify our criteria of validity? As consistency is the ground of validity, so dissidence is the ground of invalidity. If two judgments A and B oppose one another they cannot both be valid, and if there is no further consideration bearing upon the matter mere doubt or suspense of judgment is the logical result. The result of dissidence is in this respect different from that of consistency, that it leaves us, not with a single necessary result, but with the possibility of two or three results; for when A contradicts B, if we make no assumption as to the validity of one judgment rather than the other, either A or B, or both, may be false. The mere dissidence of the two leaves us with three alternatives, and no ground for choosing one rather than the other. But now, suppose a third judgment C confirming B, and here we have a motive for adopting one alternative. On the ground of C, B is true and A false. If we grant every judgment to be a ground for the validity or invalidity of any other judgment with which it is brought into relation, this result must follow. But another result follows at the same time, namely, that the dissident judgment remains a ground for disputing the result arrived at, and hence we get the conception of degree of validity. The combination B C regarded alone would be completely valid. The judgment A is a reason for disputing

that validity, and though it remains reasonable and necessary to "prefer" B C to A, this preference cannot, with a view to the three judgments alone, be taken as final. Any further judgment D may support either side. If it coalesces with A we have an equally valid system A D disputing B C, and we are reduced again to doubt. If it joins B C we have an increased reason for the whole B C D as against A. The degree of the validity of a system, then, is as the ratio of the consilient judgments to the dissident. To this we are led by retaining the primitive idea of validity as something to which each judgment of a connected system contributes, whether its tendency be to the negative or positive side.

But now, however numerous and ramified our system of corroborative judgments, a single *Athanasius contra mundum* will always cause discontent. We could never at this rate arrive at a validity which, even if we confine our considerations to the judgments concerned, would be complete. We should never be able to say that, so far as our own minds can reach and can determine the matter, we have valid knowledge. On the contrary, this validity would be always partial and problematic; however high in degree, it still would not be "validity" without drawback or qualification. We seek, then, always, as reasonable people, to come to terms in some way with the dissident. This can be effected in one way only. I have three judgments α , B, C, of which B and C support each other against α . Now a fourth judgment δ presents itself such that, combined with α , it gives the whole judgment A, which will now cohere with B and C. Then the total system, $\alpha \delta$ B C or A B C, is completely coherent internally, and therefore, so far as it goes, completely valid. The most familiar instance of this is a "psychological explanation" of a judgment. If α is a given belief, and δ reveals to me how such a belief would arise from a fact A, then the combination of α and δ itself leads me to assert A, which is further confirmed by B and C. So far, then, as an assertion may be modified without being destroyed by being taken up as an element in a new whole, we may turn apparently inconsistent judgments into actual supports of our system, and in this way we are in fact continually getting rid of discrepancies by "explaining" them away. Hence a discrepancy is not necessarily permanent, and the problem of attaining to undisputed validity is that of thus absorbing every discrepancy into a whole, which will consist with and even lend support to the remainder of our knowledge.

3. Hitherto we have assumed the possibility of connecting judgments; but to complete our account, we have now to ask

how these connections are effected. We may, indeed, have judgments which directly assert or deny the same content, but normally this convergence of two or more mental operations on one and the same point is the work of what we call inference; that is to say, a felt connection represented in our speech by such words as "therefore," "because," and the like. Now we have represented judgments as valid when connected; but when the connection itself is seen to be a mental operation distinct from the assertion of either judgment as such, the question will at once arise as to its validity. This question must be treated on the same lines as those already followed. Let us illustrate it first by showing how methods of connection may be dismissed as invalid. Suppose, for example, I have formed a highly valid body of judgments M, and another of equal cogency N, and that by the method P I am led to question M on the ground of N. Then, assuming P, I find M and N to conflict. But why should I assume P? P is itself a method of connecting; but with what judgment is it itself connected? If I can find none for it, I must, on the principles already laid down, dismiss P as invalid, though as requiring subsequent explanation if my whole system is to be harmonious.

But now suppose P (which can be analysed into and regarded as equivalent to the judgment, if M then no N) can be connected with some similar judgment Q, which I have already made, such as, if K then L. Then P has a certain guarantee, the system P Q has a validity of its own; and if a sufficiently extended system of connection-judgments thus cohere, they may suffice to validate P as against the bodies of judgment M and N. This, of course, is a question of degree to be settled on the principles above determined. What requires our attention is, that the methods of connection form, or may form, a system among one another. To form this connection is precisely the work that logic can itself contribute to the theory of knowledge.

Let us see how the work is carried out. Taking, first, inference, let us go back to the simplest *prima facie* form of explicit inference, the argument "from minor to conclusion." This is A: it is B. This inference we have taken as implying a certain principle, but we have now to inquire into this implication a little more closely. The inferential process, it will be observed, is not itself a judgment. You might call it a connecting of two judgments, or you might call it an element expressed by the word "therefore" or "because" in the whole judgment, This is B, because it is A. But a single explicit judgment it is not as it at present stands. And it is just this that creates our difficulty.

In detail, the act of inference may appear in two stages. In its lowest, least reflective form it is a process in which one assertion in fact determines another, acts as a consideration leading the mind to that other. In a higher stage, where such a word as "therefore" comes in, the mind is so far aware of its own process as to recognise a certain relation between the two contents, which it may express by saying that they are connected, or that one is the condition of the other. But whether recognised or not, what analysis has to say is that the first content operates on the mind as a condition leading it to assert the second. Further, if the inference is justified this operation must as such give a true result; the first content must be a just or sufficient ground for asserting the second. But what is the consideration taken into account? It is, as careful attention to our own thought tells us, the content A. We deal with this A, but it is not the fact that it is here and now, but the fact that it is A, which makes us proceed to the assertion, it is B. This is B because it is A, not because it is this. The content, then, or rather the character of the content, not the relations which constitute its individuality, is the ground of argument. That is, according to our analysis the act of inference makes in effect the distinction between A as a purely individual fact and A as a characteristic of the real world. A as existing in reality, not A as here present, is its ground.

The process of inference, in fact, takes A as such as the basis from which it draws its conclusion. And the process claims certainty as a process. But now, suppose there be anywhere an A which is not B, it is clear that the result would be doubtful. For A is taken without any further consideration as a condition from which B follows as consequence, and there is therefore nothing to show that this is not the particular case in which the relation A - B fails. If, therefore, we take the inference from A as such to B for a certainly valid process, we must deny that any A can fail to have B in relation to it. That is, the inference implies that all A is B. This in the last analysis seems to be the logic whereby the inference from minor to conclusion postulates the major.

The validity of the inference from minor to conclusion, then, postulates the truth of the major premiss. It follows that now, if we deny the inference in any one case we deny it in any other, and if we affirm it once we affirm it universally. The set of inferences under that major stand and fall together. They are connected by the implied judgment discovered in each one by analysis. That implied judgment is, that A taken

by itself is a sufficient ground for the assertion of B. Formed into a major premiss, this is applied syllogistically to any fresh case, and so connects each case with every other.

Now, any ordinary judgment that figures as a minor premiss from which conclusions are drawn rests no doubt upon antecedent experience, without which there would be no tendency on the part of thought to draw the conclusion from it at all. But, according to the view urged in preceding chapters, there are certain premisses upon which thought sets to work without any antecedent experience to go upon. I mean those uniformly observed relations which, in the absence of what are in fact conflicting uniformities, thought will tend to generalise. Here again we have an inference in which—to reduce it to its simplest terms—the observed relation $a_1 - b_1$ is taken as ground for the generalisation $a - b$. Now, applying our previous analysis, it is clear that if we claim to make this generalisation in the absence of other considerations determining the relations of a and b , the ground used is not the specific character of a and b themselves, but the fact of their uniform conjunction. And by our previous reasoning this fact must now become as such a basis for generalisation, and that is again an universal basis for generalisation. This means that all our generalisations—all our inferences from one content to another—will stand or fall with this principle, and therefore will stand or fall together. None can be valid unless the principle holds; all must be valid if the principle holds. The truth of one, then, implies and is implied by the truth of all the rest. Our analysis, then, claims to have connected all those ways of forming inferences—even we may say all the individual tendencies to form inferences—which, as tested by experience, give good results. The methods of inference, then, are valid as forming a connected system.

Observe now the nature of the connection. We analyse a given inference. We find that if it is warranted a certain consideration must be adequate to such and such a result. We formulate this relation in a principle. This principle, being applied syllogistically to any other case, necessitates the inference in that case.¹ Or we could equally reason from the second case back to the first, and so from any one of the generalisations carried out on these lines to all the rest, and from all the rest

¹ We see here the element of truth in the theory which would base inductive argument on syllogism. It is, however, a very one-sided truth, since the major of the syllogism in question is itself derived from the impulse to generalise, which is the basal fact of induction. Here, as elsewhere, the principle is not the *ἀρχή* from which validity flows, but that expression of coherence between truths which assures us that validity is within them.

to any one. That is, they are connected first by an analytic judgment giving their principle; secondly, by a syllogism applying that principle. The "methods" of generalisation, then, are connected by the remaining "methods" of construction or analysis.

Conversely, construction, analysis, and memory are interconnected by generalisation. Not, of course, by explicitly formulated generalisations, to apply which would involve construction and analysis, but by the impulse to generalise which precedes explicit formulation. I mean, that as we construct and get truth in one case, so we expect to do in another, and the methods of analysis or construction in parallel cases substantiate one another. Thus all the methods of dealing with the given, and making it the basis of a further truth, are connected with one another in a completed circle.

One point only might seem to stand out. I mean, the very use of one fact as the condition of another. That usage is employed in our analysis of generalisation, and is implied in any of the applications of syllogism. How, then, can it be tested? We can only answer that the notion of a condition is the basis of the conception of validity itself. That is valid which is interconnected; and to ask, therefore, why a connection should be admitted at all is to ask for a reason for the ground of all validity. Now, for the principles by which validity is tested, we cannot give any reasons of which the validity is *already assured*. To expect such reasons would be a self-contradictory demand. Whether in any other way we can support our conception is a question to which we shall recur at the end of this chapter.

If, however, we are asked proof of the validity, not of the notion of system in general, but of any given method of connection, such as the axioms of reasoning, we may claim to have some answer ready. It is not self-evidence, nor a generalisation from experience, nor yet the fact that it is a method by which thought works, which establishes a principle. It is the interconnection of a mass of methods of thought which establishes them all, and our axioms claim to be valid precisely as formulating this interconnection. They are the generalisation of all such methods of generalisations as are undisputed by the facts; and if they in turn are to be modified, it must be by the production of some facts, or body of judgments, the coherence of which can be explained by means of their modified form, and which is at the same time inconsistent with them as they at present stand.¹

¹ A grounded, as distinct from an unmotivated and unreasonable, doubt of the postulates of thought would arise if two incompatible systems of belief should arise and acquire nearly equal strength. In this case the reasonable

An ideal system of knowledge, then, would present itself as a coherent organisation of judgments supporting one another in virtue of certain methods of connection, the methods in their turn being supported by one another, and being consistent with the judgments which they connect; those methods and judgments which, in the formation of the system, appeared from time to time to antagonise the rest having been formed by combination with further judgments into resultant judgments which take their place in the system. Supposing such a system to include every possible judgment, it would be absolutely valid. There would be no sense in questioning its validity, as there would be no further judgment to which appeal could be made. Supposing, again, the actual body of judgments existing for us at any given time to form such a system, it would be for us the most valid truth attainable, and would be the test of any new judgment. The system as now described is the test.¹

4. We may deal here with a certain ultimate doubt of inductive science of which hitherto we have said nothing. The valid method, as we now see, must, as the first negative condition of its validity, never give a false result, never—ought we to add?—be capable of giving a false result. Now, in our theory of induction we have tried all along to guard ourselves from this contingency by a deference to the possibilities of error suggested by a wider experience. But is there not here an

attitude would be to expect and endeavour to effect a reconciliation. Such reconciliation might be brought about either by the modification of some of the results of either of both systems, or by that of the principles on which they are based. And until it should be effected, each system could only be adapted provisionally, and as an approximation of the truth. In no case could one principle or one system be preferred to another, except on the ground that it actually effected a fuller harmony. On the theory of validity, any posture of thought may be called upon to justify itself, and thus any reasonable or groundless suspicion can obtain a fair hearing.

¹ Our theory, it will be seen, tends to separate questions of validity from those of origin. The validity of reason must be tested by its own internal coherence, and by no other method. Granting reason valid, however, we must not make off-hand inferences as to its historic development. Mr. Balfour (Foundations of Belief, pt. iv chap. v) urges that to derive the premises of reason from the "collision of atoms" would destroy all its authority, because atoms have "no prejudices in favour of truth." But surely if this theory, instead of being intrinsically nonsense were demonstrated fact, it would prove, not that proof itself is non-existent, but that atoms, whether "prejudiced" or not, have at least the power of generating rational beings. As to the existence of human reason postulating a divine reason as its source, this is merely the "like-causes-like-effect" theory in its crudest form. In fact, the historical origin of reasonable beings is a question of genesis, and one of extreme, perhaps insuperable, difficulty, not to be settled by these off-hand assumptions. On the whole question we may add, that the origin of a belief is a fair test of its validity if, and only if, no positive proof or disproof can be found.

element of relativity which could not be escaped except by a mind that knew the whole of things, and knew that it knew the whole? If this is so, is our knowledge really valid after all, or is it only something possessing force for our minds as we are constituted?

We may put the case thus. Suppose, if we can conceive the supposition, a mind limited in its knowledge to a single experience and applying to that experience those methods of induction which we have assumed as sound. It fastens on a conjunction which we (suppose) with our wider experience, see to be determined by accompanying facts. But knowing nothing of these facts, it generalises the conjunction. This is clearly on our principles a logical step, and as clearly it will lead to false results. If this is so, what becomes of our certainty? and why may not a greater mind than ours in contact with a wider reality see that we in our turn are making just the same mistake?

It is no answer to say that we are already aware of the possibility, and are constantly on our guard against the assumption, of a complete knowledge of conditions as a "most dangerous downfall" to science; or that, accordingly, all cautious science guards its statements so as to cover the possibility of a difference of conditions. For the question is one of the ultimate limitations of belief and its grounds, and as to whether, when we have taken all the precautions which experience suggests, we have yet exhausted the possibilities of that which is wider than experience—reality. To this we can only reply that it is by such elements of reality as are given to us that we must judge such further elements as are not given, and these possibilities, their weight and value, among the rest.

But how then are we to meet the present problem? There are two possible answers. (1) We may say that a conclusion drawn, on our principles, from an inadequate experience is *logical* though not *correct*. The considerations, then, which we have held to form the groundwork of science would be intrinsically valid as logical methods, but will give us truth only if their premisses are adequate. How, then, can this adequacy be ascertained? It can only be affirmed on the ground of consistency as between different results, or denied on that of inconsistency, and thus so far as we find consistency we must accept the result. But is not the mere fact that inconsistency, and therefore error, exists in certain cases an argument that it may be found by a wider experience elsewhere? Yes, if the facts in that elsewhere are parallel; but, once more, when the connections are so manifold and intricate that results so formed

have never been destroyed, the counter argument from the parallel ceases, and those results are certain in proportion to their systematic connectedness. Nor can we deny that in their highest stages they reach real or complete certainty; for taking them as merely probable, some of them should within our experience break down,—and if we can find a class of a given stage of systematic interconnection clear above that in which failures have been found, the *certainty* which on our methods we attribute to its members is justified, on our principle of validity, by repeated tests. Just as at a lower stage the attribution of probability would be valid, so here is the attribution of certainty.

But if this answer is to stand, the word "certainty" must be understood in a special, though perhaps not wholly unjustifiable, sense. For by the original suppositions of induction, which it has been our business throughout to justify, observed uniformity and observed difference were not only considerations on which we could generalise, but *the only* considerations upon which we could either form or deny an assertion. And conceiving logical certainty as that which is based on a totality of considerations, we laid down, that that must be certain which is grounded on one of these considerations and is at the same time impervious to the attacks of the other. It would follow that when, as in the case suggested, we conclude from an inadequate basis in experience, we have a logical, and therefore I suppose a justified, certainty, which turns out to be false. And if, further, we compare that hypothetical certainty with the certainty claimed by our actual sciences, we must admit that they stand on the same theoretical basis. Here in our experience is a uniformity. Experience does not afford any ground for supposing an exception to it; and that, as we argued before, is as much as to say that experience rejects, negates, any exception to it. True, but this is, after all, the work of our experience, which may be as meagre in comparison with the plenitude of reality as the supposed experience was in comparison with ours.

If, then, we deduce, you are to continue in the position that induction gives certainty, you must mean by certainty an attitude of mind such as we discussed in Pt. II. Chap. X.—an attitude which is simply the extreme case of belief where no further attention is paid to the possibility of an alternative. Such a certainty will, in the terms of our definition in that place, be logically justified if it lead you right in the long run. If, on the whole, you come nearer to truth by maintaining that attitude of mind under certain conditions, then it is justified under those conditions. And if we now mean by a logical principle

one which leads us to truth, not always, but most closely in the long run, then we may perhaps say that our principles are in any case logical. For, we may contend, even if in this or that case they may lead to error when freedom from all principles would have left us in doubt, yet the way to truth is through error rather than stagnation. It is better in the long run to be guided by the evidence as far as we have got it than to sit down with our hands before us because half a loaf is worse than no bread. The over-hasty conclusion will, if we are faithful to our principles, constantly correct itself, and so we shall always be coming nearer to truth.

On this view we should always be justified in holding to our systematised knowledge, even in holding it with certainty as that word is now defined. But the real certainty would be, that we are on the right road, not that we have arrived at our promised land. The tendency of knowledge is right. Science must go on as it is going. That would be the sum and substance of our theory of knowledge. And some might say "all the better"—

*'Tis a lifelong toil till our lump be leaven;
The better—what's come to perfection perishes—
Things learned on earth we shall practice in heaven;
Works done least rapidly Art most cherishes.*

And perhaps if there is an inner arcanum and sanctuary and impregnable rock of reason this is it, that her aim and tendency, if not yet her result, are right.

But (2) there is another possible solution which may incline us to feel a fuller reliance on the inner core of knowledge, on the massive results of tradition, common sense, and the exacter sciences—reliance, not merely on their tendencies, but on their attained results, taken, of course, with the limitations which would be acknowledged in all careful statements of the sciences themselves. If it be pointed out that, at least to a less extended experience, our methods would give fallible results, our answer might be, "Yes; but our methods were not invented for an experience of that kind, but for our experience." The principles of induction claim to be true of the world that we know, claim to give us guidance as acting on the experience that we have; they know nothing of another world nor of a different, narrower experience. Within a different experience to ours there is no reason why they should give truth at all, because they are not intended to apply to such an experience. So far from being the whole consideration, they might in such a case not be considerations worth attending to in the least.

And this answer we for our part prefer, as pointed out by the character of the logical genesis of our inductive principles. They claim no *a priori* validity. They are strong, not because thought must accept them before it begins to act upon experience, and without reference to anything that experience may turn out to be, but because, reflecting on its own ways of dealing with experience, thought finds that these express the common character of all correctly working methods, while in no case, as applied in its experience, do they lead to results which cannot stand. We reply to the objection, therefore, by ruling it out of court. It lays down that our principles would, under certain circumstances different from ours, lead to false conclusions, and therefore cannot be maintained. Our reply is, that our principles are meant only for circumstances like ours; and whether they would or would not hold under other circumstances it is not our business to inquire.

This much only would remain to add. An ideal reasoned certainty would have taken everything into account that could bear upon the case in question. But what that exists could not bear upon it? And how, then, could we get an ideal certainty without knowing the *omnitude realitatis*? The results of this reflection would, at first sight, be to send us back to relativity once more, though in a new form. Certainty, it might be said, is a matter of degree, and the more certain belief is that which rests upon the greatest mass of judgment. Where in this process of increasing stability we come to actual fact is a point we cannot determine. It is enough to say, that where the greatest mass of judgments cohere there we have greatest certainty.

It might be enough to leave the matter thus. But the view that certainty must be, after all, a definite stage of belief, grounded logically on some totality of considerations, should not be too hastily dismissed. If we resolutely keep to what we experience of reality as the basis of all we know or think of it, and as determining the estimate of our own attitude to it, the whole of our grounds for or against a belief must be found within experience. And that belief which stands the test of the whole of experience in the many-sided ways which our logic requires may thus be said to have encountered all the considerations justly bearing on it. Still, the old argument comes back, further experience may modify. Well, this suggestion, again, is grounded in experience and applies primarily to the less certain, i.e. less organised, results in which we now believe. But those things which we claim as the most certain, as the really certain, are just those which advancing

experience is not found to modify, the broad tendencies of science, tradition, and common sense—understood all of them scientifically, i.e. with due limitations. The arguments from "limited experience" tell less and less as we approach them. Seeming exceptions really confirm this statement. The "miracles" of science which upset common-sense traditions, the modifications introduced by an extended science into its own original suppositions, really leave the mass of truth standing as it was, but seen in new relations and differently phrased. It is the broad result for which we contended, not the precise way in which that result is at any time understood or expressed. The theory of our theories and the expression of them are at all times among the most pliable portion of belief. But it is just these which bring the familiar truth into fresh and less certain relations.

At this point, then, the negative argument disappears, as it were by absorption. The truth that knowledge now claims as the irreducible minimum of its rights is, as we learned in Pt. II. Chap. XVI, approximate truth,—truth, some of which is all true, all of which is nearly true, and which looks to fresh experience for further definition, and welcomes correction instead of being overthrown by it. It is the living organism absorbing fresh matter and making it its own; and for the knowledge which so lives there is no death. The overthrow of particular facts is no analogy for its destruction.

And so, in a sense, we have reached the same result as before. For the knowledge we claim is not final. But there is a difference. Before we claimed only to be progressing; now we claim a result, not final, but containing reality itself. Before we claimed only to be on the road to truth; now we claim to dwell with truth. Here and there we trace her very outlines, though they be but outlines, and though our vision of them is not always clear.

5. But now, it may be asked, is not our whole theory of validity after all an assumption? We have chosen to formulate a certain test which, if our reasoning has been correct, can indeed be consistently carried out, and is so far possible. But, after all, what guarantee is there that this is the test of truth? Must it not in turn require proof?—and what proof of it can be given which will not be found to assume it? Obviously none, if it is what it claims to be; and as obviously this must hold of whatever is the test of truth. You cannot get a further test outside and above it; and if you could find that elephant to support your world, you would still require a tortoise to support your elephant. Then must the test of

truth in any case remain an isolated judgment, the one judgment that must be valid though isolated? After all that we have said of proofs and tests, does our own criterion of truth remain a mere assumption? There are two things to be said in answer to this question.

(i.) If we consider what we ordinarily mean by a "proof" on the one hand and an "assumption" on the other, we shall get some light. If we take any ordinary judgment *N* and desire to prove it, we have to find some distinct judgment *M* which is certain independently of *N*, and from which *N* follows by an equally certain and independent process *p*. If it turns out that either *M* or *p* depends for its certainty on *N*, we are arguing in a circle, and our procedure is vicious. Now for the principle which we propose as the test of truth no proof of this kind can *ex hypothesi* be found. For supposing such a proof *X*, the process by which we brought *X* into use must be some method of connecting *X* with our proposition *T*. But since the content of *T* is precisely that truths are made valid by interconnection, the argument would be necessarily circular. The method connecting *X* and *T* could not be true unless *T* were also true. We cannot then prove our conception of validity in the way in which we can prove any particular truth; just as we cannot explain the whole of reality in the way in which we can explain this or that fact. The reference to something else must, as Aristotle told us,¹ come to a stop somewhere.

But now, an assertion which is unproven is ordinarily said to be an assumption. But what in ordinary cases is an assumption? It may be said to present one or both of two features. Generally it is a suggestion, intrinsically uncertain, taken up for certain purposes which from a logical point of view may be legitimate or illegitimate. But if we connect this suggestion with other assertions, certain or probable, it ceases so far to be a mere assumption, and becomes a judgment for which some grounds may be given. The assumption, then, appears as an isolated assertion. It does not follow that every isolated judgment is an assumption in the first sense. For if there were any self-evident judgments, they might be isolated and yet require no grounds outside themselves. We must be careful, then, when we call a judgment, as though by way of stigma, an assumption, to know what we mean. We may mean merely that it rests on no extrinsic grounds, or we may mean that it is as it stands unwarranted. The latter meaning would not be involved in the former for any one who should allow self-evident judgments. For us, however, it may

¹ *Posterior Analytics*, I. 3.

be said, no consolation is to be found in this. For we have discarded self-evidence as a final test, and the isolated judgment must therefore, for us at least, be invalid. We can only get out of this, it may be urged, by a frank admission that the judgment of validity is an exception. And thus, it might be sympathetically put, would not be so unreasonable. Granting that everything else must be tested by interconnections, the judgment which tests all others falls, on that very ground, into an essentially different category, and we may be prepared to treat it differently.

But the reasons which would lead us to fall back on this reply are more apparent than real. The judgment of validity is not so isolated as appears. Consider first, not the principles by which validity is assured, but the completed result, the valid system. In this system we have a number of judgments, $a, b, c, d \dots$ all interconnected, supporting one another. Any one of those judgments, then, is valid, tested, connected. Any one of them, a or b , apart from the system, before the system is formed, is unconnected, isolated. So with any judgment p that stands outside the system now formed. But what of the judgment M that recognises the system $a b c d$ as a whole? Is this judgment isolated? Surely not; it stands on the same footing as the component judgments $a b c d$. Certainly, it is isolated as compared with any foreign judgment p . But this only means that it is not yet final. Whatever connectedness or validity is rightly attributed to its component members, that connectedness and validity must be allowed to the system composed of them as a system. The system is involved in the components, just as the components depend on the system. We may again revert to the analogy of explanation. The part was explained when it found its true place in the whole. The whole was explained, not again by reference to another whole, but by presenting itself as a system of connected elements. So it is here. The single judgment is valid as falling into a system; the recognition of the whole is valid as expressing an interconnected set of judgments.

So far of the whole system of truth. Applying the same conception to the methods of forming judgments, we have found them to form similarly an interconnected whole, and the recognition of this whole as valid is no more an isolated judgment than that of any of the distinct but connected methods. In fact, in the concrete whole which knowledge forms there is not strictly a before and after. There is not first the whole, with its truth assured, and then the parts depending on it; nor are there first the parts and then the whole. Knowledge

in its fragments is a hierarchy where certain judgments of sacrosanct authority give or withhold credit as they list ; or it is a monarchy where a single principle rules with undivided away, or delegates local authority to *media axiomata* of conditional value. But knowledge in its whole truth is a democracy where no element is before or after another, but where the value and truth of each is bound up with the salvation of the whole, and the whole rests equally on the trustworthiness of every member.

Now, the principle of validity, like every other principle, is taken out of the whole of knowledge by an abstraction, and it is so taken that it appears as an isolated judgment. But in truth it rests on the whole of which it forms a necessary element. Recognising the whole system of connected judgments as true, recognising the connecting methods as reasonable, we include the assertion of the principle of validity as sound. Neither the principles nor the system which it helps to create can be proved *abunde* as any portion of the system can be proved. There is at this point no question of proof in that sense. But neither is there assumption. Our assertion of the principle does not contradict its own requirements by remaining cut off from the rest of our thought. On the contrary, our principle approves itself as an essential element, the guiding element, in our complete system of belief.

(ii.) If remaining at the abstract point of view, distinguishing the principle of validity from judgments which are valid, we required a support *ab extra* for our principle, there can be for us only one course. The principle cannot be "proved" by judgments taken as valid. It can only be led up to by judgments possessing definite psychic force ; and it is precisely in that way that we have tried to lead up to it. There are two ways in which we can regard judgments—as having validity, or as possessing so much felt force. Now, to "prove" the criterion of validity by means of judgments which you assume to be valid, or which are valid on submitting to that test, is either to prove by assumptions or to argue in a circle. But to appeal from the validity of judgments to their *de facto* force is simply to corroborate one thing by another. As apart from a criterion of validity, judgments simply possess so much force ; the only intellectual factor therefore remaining outside that test is this force ; and if by means of analysing and correlating certain judgments we establish the criterion of validity, we have used the only means in our power to that end. The only further condition which such a process must fulfil is that neither in the judgments used nor in the reasoning which connects them

should there be any principle inconsistent with the theory of validity subsequently established.

Lastly, if we establish the criterion of validity by means of the force of certain judgments, we may corroborate it further—not as valid, but in its felt strength—by the whole mass of judgments which it sets in order. The validity-judgment, and felt certainty do not always step by step coincide; but the synthesis of judgments which is the principle of validity is also a grouping or regrouping of feelings of belief which has a marked effect on the nature and direction of those feelings themselves. Thus we may feel little liveliness of belief about any judgment taken singly; but when it has become united with many more the certainty of the whole becomes a feeling of great strength. More strictly, it is not a mere feeling but a power of acting on, producing, or abolishing feelings of certainty, a power which exceeds the most intense certainty which can be felt at any one moment. Hence the most clearly felt judgments fade away when brought to the point of inconsistency with some element of a well-knit system. The constraint, the obligation we feel to reverse our judgment, expresses the reaction (in terms of felt certainty) of this mass of felt belief upon the feeling which has first arisen within us. This subjugation of the immediate single feeling to the system is in its completeness a gradual work, and it is only as it becomes complete that the principle of validity triumphs over every opposing force.

The principle of validity, then, has in a sense both a ground and a test; but neither of these is, apart from the principle itself, valid, nor is it possible that it should be so. But it is led up to and confirmed by actual judgments in their character of felt certainty to which, and to which alone, it should on its own theory make appeal.

We may now, in a few sentences, sum up our theory of the conditions and validity of knowledge. Our starting-point was the datum of immediate *apprehension* which we took to be fact. We assumed these data, and we postulated that they can be *analysed* into elements, that they can be *remembered*, and that any portion of the continuous stream which they form can be *constructed* into wholes for thought. The relations in which they are found are *generalised*, and that with certainty, except in so far as a conflicting generalisation can be formed from the apprehended data. By these five methods, judgments and inferences of all kinds are built up, and their *validity* is tested by their *consilience*, which similarly justifies

the methods postulated. The resulting system, then, is knowledge, and is valid. Memory, or construction, or any other postulate, is justified so far as it is (α) a method of forming beliefs which (β) gives results coherent with one another, and with those formed by other methods. So far as it fails to satisfy these tests it cannot be relied upon.

Such being the character of knowledge, it remains to consider further the character of the mind which possesses it, and of the reality with which it deals.

CHAPTER III

THE CONCEPTION OF EXTERNAL REALITY¹

1. WE have now discussed the main conditions of knowledge, and have tried to show in what way a system of valid judgments, in other words scientific truth, may be built up from them. But we have to submit our hypothetical conditions to a further test. Certain conceptions pass current in our mental economy as solid and well-established truths. These conceptions not merely hold facts together by universal laws, but, as we shall try to show, distinctly attribute to them a certain nature or manner of existence. Now, though we have no doubt often enough used these conceptions in preceding chapters, we have not yet made our references to them explicit. We have been bent on explaining and justifying our knowledge of particular facts in the present or the past, of the wholes constituted by such particulars, and of the uniformities in their relations and occurrence. We have now to ask whether the factors of knowledge so far assumed will further explain such conceptions of the nature of things as we name matter, mind, substance, power, attribute, etc.

A few words may be prefaced as to the nature and limits of this inquiry. As to its nature, one general principle must be laid down, viz. that nothing must be taken as final until it is submitted to all known tests. This undoubtedly makes our inquiry more difficult. If, for example, we could take the notion of matter and its independence of mind as ultimate data, we should have to explain them by our theory of the conditions of knowledge. And if our theory as hitherto developed failed to explain our knowledge of these data, we should have to say "so much the worse for the theory," and set about remodelling it. If, again, we could take our conditions of knowledge as certain and certainly exhaustive, we could make them an absolute test for the existence of matter; and if

¹ In regard to this chapter, I am under special obligations to Professor Case, and to his private teaching even more than to his published work.

the knowledge of matter could not be explained in accordance with them, it would be that conception which would need revision. Hence, in fact, thinkers who have assumed one or other end of this problem as fixed have generally made very short work of the rest. In our theory, however, there can be no reason for taking one side of the question for granted rather than the other, and the only remaining alternative is to test both sides together, to be ready to abandon any element which stands out in manifest contradiction to the total system, and to accept, at least provisionally, any account which is harmonious throughout and consistent with everything that must be taken as fact.

This short preface will also indicate the limits of our present inquiry. Our primary object, it will be remembered, is to lay down the conditions of valid judgment or knowledge. And for the discovery of these any judgment claiming validity may at least be useful. But to examine any and every kind of judgment made by man is clearly out of the question, and the problem is to get, within manageable reach, a fairly representative series of tests for the conditions we are suggesting, whatever these might be. This test is most readily obtained by examining, in connection with its conditions, each *summu*m genus of conceptions. For if we can explain the formation of the genus we may fairly presume, at least until evidence to the contrary be produced, that the same mental operations applied to different material will also explain the species. If you can explain the genesis of the idea of matter, it will readily be seen that differences in the nature of the observed facts will distinguish solid and liquid, metal and non-metal, element and compound. So if we once postulate the conceptions of matter and motion, there would, I imagine, be no difficulty, so far as our problem is concerned, in explaining the conceptions of force, energy, or momentum. Nor, again, postulating these, would there be any epistemological problem with regard to impact or gravity. But if we turn to the conception of mind the case is different, for here we have a conception which is at least *prima facie* generically different from any of those hitherto mentioned. And here *οὐκ ἔστιν ἀναβαῖντα διέξαι*. Our assumed conditions might explain every species of concept under the one genus, while quite inadequate to the other.

It will be observed, then, that our problem ends (as it should) where the questions of physical, and we may add psychological, science begin. The physicist does not consider how his fundamental conceptions of matter and motion are

found. Nor, therefore, does he criticise their *ultimate* value. His theory of matter, if he is concerned with one at all, is simply as exact a determination as possible of the results derivable from certain methods and certain conceptions which are taken for granted. The only question for him is what these methods prove or suggest, and what they prove is for him (and quite rightly) final. But whether the whole set of conceptions, from beginning to end, might not have to be remodelled by a further criticism, whether, that is, the conceptions of the specialist at their highest perfection, express ultimate reality is a further question which does not concern him but does concern us. Our business is with what is to him the ultimate genus. And hence our inquiry, primarily concerned with the conditions of knowledge, comes also to fill up the gap left by the sciences in our knowledge of existence. The *summa genera* of reality belong to the problem of knowledge.

A full theory of knowledge ought to enumerate these *summa genera*, and that from every possible point of view. It ought to decide how each of them is to be conceived, and what epistemological conditions are postulated by each severally and by all together, while as the parallel problem it should determine the measure of validity to be attached to each. I do not in the present and following chapters make any pretence to such completeness. I confine myself to the treatment of such conceptions as have played the most prominent part in the theory of knowledge, in order to see how far they present difficulties to our present conception of intellectual operations.

2. I begin with that distinction among objects of knowledge, which has probably played a greater part in the theory of knowledge than any other—the distinction between self and not-self. This distinction may be confounded with two others, viz. that between subject and object, and that between mind and matter. All these three are, in fact, separate antitheses. For the self may be object, as when I am aware of my own feelings, my own existence, etc. And again, the not-self may be either mind (e.g. you) or matter (e.g. my pen). Such, at least, is the *prima facie* state of the case. In the present and following chapter I propose accordingly to develop the conception of matter, first, negatively, by its distinction from the self which thinks, and then more positively by a consideration of the facts which combine to form it.

We begin, then, by asking how in general do we come to distinguish that which is from that which is not ourselves. We must start by admitting, with Hume, that no particular

perception ever makes this distinction for us with indubitable certainty. We may confess that whenever we try to think of ourselves we always "stumble upon" some particular perception of love, hate, joy, anger, or what not. Likewise we must admit that there is no object of the "outer sense" so sure but that we may be deceived as to its externality. Nor, though we might correctly perceive its spatial externality,—its being outside that particular coloured pliable surface which we call our body,—would this be in any way the same thing as its actual existence independently of our mind. For the whole matter, outer body, space, and all, might be a creation of the mind's activity.

We go back, then, to the primary data of apprehension, with the admission that there are not among those data as they stand any which could give us the distinction which we undoubtedly make, and which we are required to explain. I apprehend a content which I describe as a hard, coloured surface. This I judge to be matter and not-self. I apprehend hot-throbbing-achy, and judge it to be feeling and a state of self. But, as we urged in Part I. Chap. I, in each case the second assertion is a true judgment, and is not a part of the apprehension. What is given or apprehended is in the first case hard-coloured-extended; and in the second, hot-achy-throbbing. Why is the second content referred to the self and the other to the not-self? Or what are these concepts under which I bring my two particulars?

3. The answer is to be found, not immediately or wholly in any character of the facts as given in apprehension, but in their behaviour and relation with facts similar or different. This will be clearer if we first define a little more narrowly the meaning of the contrast between self and not-self. Among the various contents of our apprehension we have some that are tangible, coloured, extended, that move in certain uniform ways, and to which under certain circumstances the natural man attributes taste, odour, or sound. We also observe feelings, emotions, ideas, beliefs, acts of will and effort; and finally, the acts of apprehension, judgment, and other intellectual operations become in their turn objects for our observation. A point of distinction and also of union between these two classes of facts is found in that particular coloured extended, etc. object which I call my body. For the first class of objects (with the exception of the bodily surface itself) are all located outside, the second all inside the body, this locating being, as Professor James has well shown, not an arbitrary operation of the mind upon the given object, but a part of the

given character itself. Calling the first provisionally the external world and the second the self, we find that the phenomena of each group vary for the most part independently of one another, "external" facts perishing while feelings, etc. change, or changing while feelings persist. No alteration in my feelings, emotions, will, etc., disturbs the walls of this room in their several relations. They look down cold and unmoved on my joy or my sorrow. They resist my will or aid my efforts with impassible neutrality. It is true that as an observed fact the said walls depend for their existence on a certain position of my body, which in its turn depends on will, and is accompanied by feelings, whether from the muscles or the joints. But here, again, a little analysis shows that it is not the "inward" state of feeling which is really "relevant" to the appearance of the walls. If I am in the room and my eyes are open, all I have to do is to remain quiescent and they continue to appear. If I am out of the room a quite different set of inward feelings will precede their appearance—acts of will, muscular efforts, etc., and these again will differ according to the place from which I start and the door by which I enter. Putting all these facts together, it appears that the real condition of the appearance of the walls is not anything in feeling, etc., as such,¹ but only the presence of my body in certain space relations to them and to various other objects (floor, door, passage, etc.). The result is that the content "wall" is independent of the contents,—feelings, will, beliefs, ideas, etc.,—but that it is not yet shown to be independent of my body or my observing consciousness. Pause for a moment, however, to contrast the case of a feeling. All the time that I am experimenting with the perception of the wall I am conscious of an acute pain in my left under-jaw. This pain is given as in my body; it moves about with me, independently of all other space relations; it is affected in some degree by concentration of the attention upon other things, but the mere presence of any spatial object affects it not. The two contents, in short, have entirely different modes of behaviour. Their interconnections, the laws of their appearance or disappearance, are as widely different as possible. Hence contents that range themselves along with my aches and pains as dependent on one another, or on my body, no matter in what part of space I am, become classed together as the self; while, conversely, those which are given in permanent space relations, or as changing their relations in accordance with certain uniform laws of motion, are classed in their turn

¹ Feeling, of course, might operate more directly by affecting attention. That case will be covered by considerations advanced lower down.

as dependent, not on the stream of feeling, etc., but on themselves or on one another.

But now we must go back to the point from which we broke off. Independence of *other* psychical facts, it may be said, is easily proved. But our argument has not shown it also of the bodily presence and the perceptive consciousness. Of these points it would, I imagine, be allowed that the first followed from the second—my bodily presence could be taken as the condition of a fact's appearance only as it is the vehicle of my perceptive consciousness. We have now brought to a single point the question, what characteristics in a content make us attribute it to the not-self? We distinguish a content from self only when we believe it to exist whether we apprehend it or no. If, for example, I believe the content A which I now apprehend to continue in existence when my back is turned, then I may believe¹ A to have an existence independent of me; or whenever I believe a content A, similar to A to exist, although I do not and never did apprehend it, then I can assert the existence of A independently of me. In the judgment "A has independent existence" there is therefore no characteristic attached to the content A which marks it off as a content from A as given. Independent existence is not a qualitative perceptible character. It is a negative characteristic of the conditions of A's existence. It says, "The A which I now apprehend would exist now and would still be A even though I did not apprehend it, and thus (for example) it may continue to exist though I should cease to apprehend it." We shall see later that this "independence of the apprehending consciousness" applies to certain aspects of the self as well, but as it is the most important and difficult condition of the not-self, we may treat it in this early stage of our discussion as the only point to be considered.

We are brought, then, at once to the question, How can this independence be known? And the answer is, that it depends entirely on our success in discovering universal laws in the occurrences of phenomena. Thus if the relation A - B is universal, and I am given A, I infer the existence of B. But if I do not in a given case apprehend B, I am forced to the belief that B exists without being apprehended. Or if we put B = A and take the continuance A - A to be universal, or universal under certain known conditions, then in any case of A plus those conditions I am led to the belief, not that A ceases to exist when I cease to contemplate it, but that it continues precisely what it was to my apprehending consciousness.

But is it ever possible to eliminate the fact of apprehension

¹ I.e. in the absence of other reasons for attributing A to the self.

itself from the conditions of a phenomenon? I reach the universal A is B by observing some case $A_1 - B_1$. But now, what were the facts in their entirety? Surely the apprehension of A_1 followed by the apprehension of B_1 . I may, by the methods of difference and agreement, show that CDE and the rest have nothing to do with B , but how am I to apply this eliminative process to the fact of apprehension itself. I can have no given case of A and B without the apprehension of both terms being given also to my reflective consciousness. Hence must I not conclude that it is the apprehended A which causes the apprehended B ? This difficulty is dispelled by the case where B is given without A . I am watching a landscape into which there suddenly dashes from its tunnel an express. In the previously apprehended contents, the landscape, no cause could be assigned for this new appearance (for we have, to go no further, the immediately suggested negative instance of the landscape unchanged for hours). The cause, then, by this instance, is in something unobserved. This alone would sufficiently demonstrate the existence of a something apart from observation, though it would not tell us what that something was. But by previous experience I have found certain positions and motions of a body to imply certain antecedent positions and motions, and I have "no reason to suppose" that any other cause exists which could produce these positions and motions here given. Hitherto, indeed, I have had observed motion as the antecedent, but the present case operates as a negative instance eliminating the characteristic of being observed. This, then, is my case. For the given effect B I have been led by previous instances to suppose a cause to be discoverable within the total "observed A ." The present instances show that the "observed" has nothing to do with it. But B must have a cause. I have no reason to suppose that cause to lie outside "apprehended A ." But A is not here apprehended, hence A as such is the cause of B , and exists here unobserved. If it is replied that the case might equally be taken to prove that some X altogether different from A is the cause of B , that cannot be admitted. Only the observation that A was absent from the place, where according to previous experience it should be present, could go to prove this. But *ex hypothesi* we are not able here to observe all that place so as to see that A is not there. All we can say is, that we do not see that A is there. Our observation of A alone is absent, and it alone is accordingly excluded from the cause of B . To sum up, I believe the cause of B to lie in the observed A , and that accordingly that fact or some part of it preceded B here. But the observation of A did not occur here, therefore

A unobserved, or some part of it, did occur here as the cause of B.¹

We may indeed put the whole matter more simply in accordance with our final statement of the inductive process. The observed facts A and B always go together. We must therefore suppose them to do so in any case unless we have reason to the contrary. Now we observe A and we assert B, but B is not observed. This is no reason for denying B unless we have observed the place where B should be and found it absent. Hence if we have not examined B's "place" we assert B to exist there unobserved. And the inferences are converging. In the series A-B-C, I may observe A and C without observing B, whence both relations A-B, C-B converge on the assertion of B and strengthen one another. The result of non-observation of presence (as opposed to positive observation of absence) is thus to eliminate the qualification of "being observed" from the antecedent or consequent of a fact, but not in any other way to modify the character of the antecedent or consequent suggested by the uniformities observed. We conclude that an ordinary process of induction distinguishes for us the "outer" from the "inner" world in the sense of showing that this outer world does not depend for its existence on any of the feelings, activities, etc., which, along with the apprehending consciousness, itself we group under the conception of the ego and its states.

4. Scepticism may object that another explanation of the fact is possible. The *de facto* continuity of sensible things and their apparently universal connections may be accounted for on the supposition that there exists an external order quite different qualitatively from that which we perceive. Let α be continuous through observation and permanent in successive observations. We have inferred from this that α exists continuously whether we perceive it or not, and is therefore independent of our perceiving consciousness. But it may be alleged, what really exists continuously is some A which never enters into the range of my observation at all, but which is such as to produce α by acting upon my consciousness. And similarly with regard to change. If I could so establish the universality of $\alpha - \beta$ that it should be beyond all doubt; then given β perceived, it follows that α exists unperceived, and is therefore independent of the perceiving consciousness. But according to our own theory of induction we can only establish an

¹ It would similarly be a misconception to object that the argument is circular on the ground that it must prove A present in order to prove it the cause, while it proves it present because it is the cause. A is proved to be the cause by being present in other cases. Being the cause, it is inferred to exist here.

universal $\alpha - \beta$ by some method of elimination, a method which is a bruised reed as soon as we rely on it as against the suggestion of unobserved concomitants. Hence supposing a pair of universal correlates $A - B$, themselves unperceived, but acting on consciousness so as to cause that reaction which would constitute the apprehension of $\alpha - \beta$, no inductive method could eliminate these concomitants. Whence it must be conceded that their existence remains a possibility.

Yes, but an unmotivated possibility. As we showed above, there can be no ground for assuming any unobserved cause except failure of uniformity within the range of observation. Now, the theory suggested, which is in effect the thing-in-itself hypothesis in its relatively reasonable shape, wants us to assert an unobservable cause precisely where uniformity is found. If we inquire for a moment on what analogies the theory really relies we shall see how truly it may be described as groundless. Certain illusions, for example, are very easily explained as the effect of some reaction of our nervous organisation on a given physical agent. The same explanation may even be extended to some at least among "secondary qualities." Thus the sensation of heat may be "explained" as a mental reaction upon a certain stimulus of the nervous periphery by the molecular motions of an adjacent solid or fluid mass. Well, granting this, whence does the explanation derive its plausibility? From two considerations—(1) the *observed phenomena* of heat by which, through ordinary inductive methods, physicists have inferred the probabilities of vibratory motion, explaining, as such motion would, the facts of radiation, conduction, reflection; and, again, expansion, change of form, and so on. And (2) the *observed inconsistency* of our perceptions of heat—the old facts of the water which is hot and cold to the two hands, on which Locke quite rightly relied.

Now mark these two points. As long as you have observed facts to support your explanations your position is strong enough. You are "explaining" in the only way in which that operation can be genuinely carried out, viz. by assigning the effect to observed antecedents, or subsuming the operation under an observed law. But when, instead of pointing to an observable antecedent, you assume the operation of one that *ex hypothesi* cannot be observed, you can have no law by which to explain the operation you suggest, no analogy by which to make it plausible, no fact to give it reasonable ground. The truth is, that while Locke, in his plain, half-naïve way, took the action of primary qualities of matter as

the ultimate account of all sense-perception, the thing-in-itself theory used this analogy in an illegitimate manner. For the unknown, indescribable thing was supposed to act on the mind after the fashion of the part-observed, part-inferred action of the familiar physical thing through the bodily organism on the sensitive subject. Really, from the terms of the hypothesis there could be no analogy.

But it may be objected, we are going a step too far. Grant that there is no analogy in the manner of operation, there is at least the fact that the sense-perceptions referred to may be said to deceive us so far as we attribute them to outward things. If the action of physical agents in the hands of a conjurer can produce temporary illusions, why should it not be an arch-conjurer who dazzles us with this vain show of a physical order? Or if we reply, that the cases of actual illusion are too few and unimportant to constitute a serious argument, what do we say to the constant and regular perception of secondary qualities? If the "reference" of heat and colour to an external world is illusory, if it is to be explained by the action of a colourless substance devoid of temperature, is not this deception on a large enough scale to justify us in carrying doubt still further?

The answer to this brings up our second point. The alleged subjectivity of certain "secondary qualities," certainly in Locke and in some degree in Democritus,¹ was based on the *de facto* irregularity of the deliverances of consciousness upon those qualities. It was really this which suggested that they could not be "in the thing." Now this, so far as it goes, was good argument, and if the alleged want of uniformity cannot be explained away, the conclusion is just. But where no such want of uniformity exists, i.e. where we have reduced the phenomena of the senses to an orderly, coherent body of facts without assuming any agents beyond those observed, what need we of further hypotheses? The reason for them fails at the point where irregularity gives way to uniformity.²

As to the thing-in-itself, then, the argument may be

¹ See Theophrastus de Sensu 61, quoted by Ritter and Preller, *Hist. Phil.* 6th ed. 152: "αὐτοῦ δὲ ἡ σὺν εἰς ἑαυτὸν καὶ μὴ τοῦτο ὡς αἰσθητὸν τοῖς ὄψεσιν," etc., and cf. Burnet, *Early Greek Philosophy*, p. 358, and note.

² It may be said that at least there is nothing to negative the suggestion before us. An outer reality conditioning our perceptions, yet never perceived, cannot, it may be urged, be contradicted by our inductions, because *as hypothesised* they never come into contact with it. But this is not so. Our inductions go to prove that, e.g., the observed fact A is the total ground of the observed fact B, that A becomes B, and so on. All this would be untrue if it is not A that becomes B, but an unperceived M which is responsible now for our perception

summed up thus. According to our theory of induction any suggestion must have grounds in observation: a cause of unknown character may be logically assumed only when observable facts present us with breaks of uniformity which cannot be otherwise explained. Hence, where a mass of inferences converge on the conclusion that a certain reality persists or changes in accordance with a uniform law, to suppose an unobservable external agency breaking up¹ that uniformity is to reject the strongest inferences we have on the ground of an unmotivated suggestion. There is, accordingly, no reasonable ground for supposing such an outer order.

The reference of a content to the external order is an act which stands or falls by the same logical test as any other. If it harmonises with other references which we make, it is confirmed by them; and if we have a coherent system of judgments making such reference, we must accept their result in this respect as in others. Here, as elsewhere, the isolated judgment frequently breaks down, and so it is not necessarily this apparent colour or this perceived shape that belongs to the object, but the "corrected" colour or "true" shape as tested by the remaining judgments which we make upon the object. That which forms the only basis for a harmony of judgments is here, as elsewhere, the reality.

5. An argument closely connected with the thing-in-itself theory must be noticed here, though a brief allusion to it will be enough, as we have discussed its main principle in another connection. It will be said that the kind of independence for which we have argued is not in question. No one supposes that a previous state of my consciousness is the whole cause of my present perception. But the contention is that granting a real world operating on the mind in perception, still the perception itself is a state of mind, and as such determined in part by the constitution of the mind itself. This argument may be put in a special or in a general form. Specifically, it is alleged that the sensible fact on which we rely as giving us a glimpse of the external order is of an ambiguous character. The true

A, and presently for our perception B. Granting the validity of science and its laws, they are therefore directly incompatible with this form of phenomenalism.

It may be added, that the very instances on which the suggestion relies cut both ways. If the "real" order is often misapprehended, we find this out by the contradictions in which our misapprehensions involve us. And this is evidence, not only that other misapprehensions are possible, but also that they will betray themselves by their inconsistencies—in fact, that a parallelism of the kind and extent suggested by the theory is not possible.

¹ I say "breaking-up" because the uniformity which the thing would substitute is different from and largely incompatible with that which we actually infer.

unit of knowledge is the representation, and to this the forms of space and time are contributed by the structure of the sensibility itself, while the unity, substantiality, etc., that we seem to find in objects is really in the same way the contribution of our understanding. Thus the result which is for our consciousness the primary fact is at the same time a product in most essential respects of that very intelligence which seems merely to apprehend it as a passive spectator.

This conception of Kant we have already rejected. The formless sense-datum postulated by the theory we believe to be a myth, the product of a false abstraction. We can verify no fact of sense that has not duration, nor any spaceless fact that subsequently becomes for us extended. True, it was Kant's own contention that space and time existed from the first in our representations, but it was a contention that proved fatal to the very theory which it came forward to support. For the unverified character of that formless multiplicity of sensation on which half the *Kritik* rests is thereby openly confessed. And as with space and time, so with the constitutive categories. When I judge "this is an ink-pot," I do not superinduce a conception of unity on a number of data which are without it. It is true that the data are multiple, but they also present a unity of outline, spatial position, and so on, which is as real an element in the given total as the multiplicity itself. It is true, again, that the category of unity, in the sense of the fact of unity, is implied in the term ink-pot. It does not follow that the fact of unity, or the conception of it, logically or psychologically preceded the fact or conception of the ink-pot. You have not the unity before you have things that are one any more than you have the things that are one without a unity. If Kant had been merely arguing against an empiricist who did not know his business, and wished to show that logically the fact of unity is implied in the first single object we come across, and could not be derived from a multitude of disconnected data, there would be nothing to be said against him. But the disconnected data into which unity is introduced are as fictitious as the disconnected data from which unity is derived. Unity as well as multiplicity is found in things. The conception of unity is arrived at by analysis of objects that are one. In *this* relation the abstract is not prior but posterior to the concrete, the concept to the fact of sense. But logically there is no such relation: the element of unity is contained in the thing that is one.

The regulative or dynamical categories are indeed in a different position. Our treatment of substance is not now in

question, so I say nothing of it. But the causal relation is clearly not given in the way in which a space relation is given. It is not to be found in sense by a mere analysis. But, then, this very fact puts it out of court in the present discussion. We are not now considering the validity of the principles which build up our conception of reality by means of complex syntheses of given fact. We are considering whether the perception from which these syntheses start can itself be taken as giving us any glimpse of an external order, or whether what we know of the constitution of such perceptions is fatal to this belief. Only such categories, then, as are alleged to determine the actual building up of the separate representation (Kant's mathematical or constitutive categories) can come into consideration here. The Kantian relativity, then, is bound up with a theory of sensation which we cannot accept.

6. The general principle of the Kantian view has been put perhaps in its most seductive form by Lotze, and to this general conception we must now direct attention. Lotze reminds us¹ that when a state *b* arises in a substance *B* under the influence of a change *a* in *A*, it is a common but obvious error to refer *b* to *a* alone. Really *b* is dependent on *B* as much as on *A*. Thus the wax (*B*) takes the image (*b*) of the seal (*A*), not merely because I press (*a*) the seal upon it, but because of the nature of the wax—at once yielding and firm enough to "set" in its new form. So it is with any mental act. Suppose an external agency (*A*) operating (*a*) on my consciousness (*B*), then my consciousness will be stimulated to evolve out of itself an act of sense-perception (*b*): and the character of the perception will be as much dependent on the nature of my mind as on that of the object which it perceives. Thus, to give an analogy, the barrel-organ (*A*) grinding in the street (*a*) sends the little boys (*B*₁, *B*₂, *B*₃ . . . *B*_n) into raptures (*b*), while it drives me (*C*) to exasperation (*c*). And so it is with perception, as we can even make out in detail for certain stimuli. Thus my judgment of the temperature of a body palpably depends on the temperature of my own skin at the point of contact. My judgment of colour depends upon complex relations of contrast, etc; my judgment of the degree of any sensible fact on the total stimulus operating, and so in a thousand other cases. But it is also possible that in some cases and in some degree we are built so as to see askew; in other cases and other relations we are built so as to see straight. Granting—what cannot be denied—that my perception is a mental fact, referable as an effect as much to my mental or

¹ See, for instance, *Logic*, bk. iii. chap. iii. § 325 ff.

physical constitution as to the nature of the object operating through waves of ether on my second cranial nerves, or by waves of air on my eighth, it is quite possible that I am so constituted, eyes, ears, nerves, brain, mind, and all, that the state aroused in me as the net result is *precisely one in which I am aware of that object* which has just set this ether or the air in motion in my direction. Just as one object acting on me may arouse a feeling bearing no relation whatever to the character of the object, so another object may arouse a perception which does relate to the object itself. It depends on the way in which our minds happen to have been built. If Descartes' almighty Puck built us all as a gigantic joke to see how much he could take us all in, then I grant it is likely that our perceptions bear no more relation to a perceived object than a sense of nausea to the movement of a ship. But failing evidence for this kind of creation by way of joke, we may leave the question how we are built open and may decide if we can by the ordinary logical test of consistence as between the deliverances of the perceptive consciousness. So far as my perceptions tolerate and support one another, so far I take them as correct in fact; and if the synthesis of these perceptions involves me in the belief that the facts they report are external to my consciousness, I accept their evidence. Their inner aspect, their dependence on my inward constitution, is not in point, because it decides nothing as to the way in which I am constituted. If I am so formed that under given stimulus I judge facts to be "there" which are not "there," why, then, I judge, and always shall judge, wrong. And if I am so constituted that under the same stimulus I judge that to be true which is true, then I shall judge right. But in which way I am constituted the theory does not and cannot tell us. And there seems but one test by which we can learn—our old acquaintance, the consistence of results. In fact we may say that these tests operate in the very cases which might be relied on by an opponent as analogies for the relativity view. Optics, and in a lesser degree acoustics, actually do reconstitute our world of perception in some degree. And this strictly on the ground of consistency as between the deliverances of consciousness. Take one instance. The shriek of the locomotive as it rushes towards me rises in pitch, while to you at the other end of the platform it seems to fall. Here is a discrepancy which is rectified at once by a simple deduction from the theory of sound explaining both phenomena at one stroke, and at the same time leading both of us to correct our first judgment and hold instead that the

pitch in fact remains constant. If the whole mass of our perceptions were systematised after this fashion, the corrected values which they would give would be the true external order.

In fact, Lotze's theory would have weight only against some crude theory of emanation, or efflux, which should treat the perception as an actual copy within the mind of the external fact. It is not a copy. It is not like the external fact. If, so to put it, you could get at my perception of this tree, and perceive it as I perceive the tree, it would not look at all like the tree. It would not strictly "look" at all, i.e. it would not itself be visible. It would not be a sort of retinal image with the soul for retina, but it would be an act of consciousness referring to the tree, recognising the existence of the tree—as disparate from the tree itself, as the tree is disparate from the motions of the ether or the molecular changes in the optic nerve and the occipital lobes which "intervene" between the appearance of the tree in the line of vision and my perceptive act. The perception is undoubtedly *quâ* perceptive act the mind's own creation. It is thoroughly psychical in character. But this does not for a moment prevent it from being a correct recognition of its object.

7. But another difficulty occurs. How is it psychologically or metaphysically possible that we should get to know anything of an order of things independent of the mind? The primary fact of perception is that which is present to our consciousness, and surely that which is present to is also "in" our consciousness, in the sense of being some one of its states, modes, or manifestations. Granting this, can we ever arrive at a knowledge of external things? I should answer, certainly not. Inference, as we have been contending all along, goes by resemblance, and if we are asked to infer an external order from the facts of perception, we must ask in reply where is the experience of any similar order given. *Ex hypothesi* it is in no case given. Therefore neither can it be inferred.¹ To illustrate. It is sometimes urged that though direct perception is confined to the world of mental representation, we must yet infer an external order of some kind as the cause of such representations. But how, ultimately, do we know any causal relation? By observation and experiment. And this involves observation of both terms, the cause as well as the effect. If, then, we could once observe an external object A acting upon the mind so as to produce the presentation or representation *a*, we might make such an observed relation a basis on which we might rest subsequent explanations of the presentations *β*, *γ*, etc.

¹ Cf. Professor Cass, *Physical Realism*, p. 69.

But since *ex hypothesi* we can never observe A, such a basis of inference entirely fails us. We must accordingly give up the notion that a world external to mind can be known by inference alone, while direct perception is confined to the mind's own inward states.¹

Either, then, we must admit direct perception of an external order or we must refuse knowledge of such an order altogether. To have direct perception means, in the phraseology used in this work, to have a fact given in apprehension or present to apprehension. Now, how can a fact be present to the mind without becoming part of the mind? We may answer this first by an analogy. What happened to me yesterday is known to me at this moment by an act of memory. This act is an assertion made at this moment. "I was sitting here writing at this time yesterday morning" is a judgment which I make now, and which asserts a past state or action of myself. Now, that past state is in a way present, and its being present is no accident, but is the essential point of my remembering it. But whatever interpretation we may give to its "presence," whatever theory of the mind and its nature that fact may suggest to us, we cannot so interpret its "presence" as to do away with its reality in the past. This would be to destroy the very memory-judgment, which, as argued above (in Pt. I. Chap. IV.), includes the pastness of the fact as part of its content, upon which our whole reasoning in the matter rests. The true interpretation of the facts, neither taking away nor adding anything, is that I now make an assertion of a fact that existed in the past. That the fact is now in my present consciousness in the sense of being referred to by it does not in the least affect the truth that it really was in the past and is not now. Similarly, I apprehend a fact external to my own consciousness. That is, there is within my consciousness an assertion of a fact external to it. That the external fact is referred to in my assertion does not make it a part of my asserting consciousness any more than the past fact was made merely present by the reference of my present consciousness.

But this is only an analogy, and still the question remains whether there may not be a difference. Have we not said that apprehension is always of fact, while perception is notoriously fallible? How then can we speak of direct apprehension of external objects? To answer this, to clear up the parallelism

¹ This point Berkeley may fairly be said to have proved, whence, granting his initial assumption, taken from Locke, that the object of immediate knowledge is always an "idea" in our own consciousness, his conclusion follows rigorously.

between memory and apprehension, and to see what precisely is the part played by apprehension in our knowledge of the external order, we must go a little further into the theory of apprehension and of assertion in general. In relation to every assertion we may, at least in thought, distinguish three points. There is, 1st, the abstract fact of assertion—the fact that an assertion is made; there is, 2nd, the content of the assertion regarded as qualifying the assertion itself as a mental event; and, finally, there is, 3rd, the content regarded as the fact which, if the assertion is true, exists. Thus in my memory-judgment there was involved, first the fact that I formed the judgment, then the content of the judgment ("I was sitting here, etc., yesterday"). Now, this content, whether the judgment was true or false, undoubtedly qualified my asserting consciousness at the moment of assertion, and was then as a quality of a mental event undoubtedly real. But if the judgment was true, the content "I was sitting," etc. existed also as a fact, independently of the present memory-judgment—existed in truth, whether that judgment should ever be formed or no.

Now, an assertion *quâ* mental event is undoubtedly an element in my consciousness, and in my present consciousness to boot. The same is true of its content *quâ* a quality of the assertion itself. But this does not apply to the content *quâ* fact asserted. In this sense the content is not necessarily an element in my consciousness at all. The idea that it is so rests on an inexplicit confusion between the fact asserted and the fact that I assert it. And this confusion is as fatal to memory—or to any judgment about self, past or future—as to perception of an external reality. For the assertion that I make *now* is an element in my *present* consciousness; and if assertion and thing asserted are confused, my past or future state must really be present, and memory and expectation disappear. On the other hand, once understand that the fact asserted need not exist in the conscious act of asserting it, and there is no reason why it should exist as a part of the history of that consciousness, i.e. there is no reason why it should not be independent of or external to the conscious series just as it is independent of and external to the "passing thought."¹

Coming now to the truth or falsity of an assertion, we may have three different cases. (1) The assertion may, like the memory-judgment just instanced, assert a content as existing

¹ As to the "relativity" involved, according to dialectics of the cruder sort, in the very notion of an "object," it is enough to retort with Kisch, "Relativ ist . . . nicht das Sein der Objekte, sondern ihr Objectsein" (op. cit. li. 2, p. 150).

independently of itself, and then the judgment may be true or false according as the content does or does not, did or did not, will or will not, exist. (2) The assertion may be only of a content qualifying the asserting consciousness. To this assertion memory itself may be attenuated, *e.g.* "You may attach what weight to it you please, but I assure you that I have the distinct remembrance of being there." Here the assertion is of the remembrance as qualifying my present consciousness. Lastly (3), we may simply not distinguish between the content as qualifying consciousness and the content as independently existing. "Tam Pearce's old mare doth appear gasbly white"; but whether it is only an appearance or the veritable animal "in her rattling old bones" is a point to which we do not commit ourselves.

Now, apprehension we have all along treated as a form of assertion—its differentia being that it asserts only the present. Then in apprehension we may distinguish, at least in thought, the same three aspects—the fact of apprehension, its content as qualifying the apprehension, and its content as that to which the apprehension refers. Thus, *prima facie* treating apprehension like other assertions, we should expect to find on the one side the act of apprehension with the content qualifying it; on the other, the fact apprehended. And this it may be said we do find in those apprehensions which we call perceptions. There is the oblong white shape before my eyes (this paper); here is my perception with its own definite quality. What the perception asserts is not as such its own quality, but determines that quality, and while distinct from the fact of the perception is present to the perception. The perception, in short, is an act of reference to the object, just as the memory-judgment was an act of reference to the past event. The only difference is in the nature of the reference. The memory asserted its content as past; the apprehension is aware of its content as present to it. With this difference, perception and memory are in other ways analogous in relation to their object.

Passing to the class of apprehensions which we call feeling, the analysis is more difficult. Here the content asserted is such that it can only be taken to exist as qualifying the apprehending consciousness itself. My headache is non-existent if I am not aware of it; while, conversely, the fact that I am aware of it proves its existence. Here, then, the "*esse* is *percipi*," and the content asserted and the content as qualifying the assertion tend¹ to fall into one. I am asserting an element

¹ Tend, because as long as consciousness maintains itself the element of recognition, admission, or attention to the content is still a feature of it.

in my own asserting consciousness, and in reality the assertion and the fact asserted are here bound up together. At this stage, then, the distinction of the content as qualifying the assertion and the content as fact asserted falls to a mere difference of aspects. The painfulness of my headache may be looked at indifferently as an object felt or as characterising my recognition of my present state.

We may then distinguish acts of apprehension as consisting of (a) feelings and (b) perceptions. In the case of perception we contend that an external reality is the fact present to the apprehending consciousness. One word here will be enough to remind the reader that though this is so, apprehension cannot, on our principles, be aware that it is so. There is no intuitive perception of the externality of the object. There is "intuitive," i.e. direct, perception of objects which are in fact external, but not intuitive knowledge that they are so. This knowledge is gained by a system of inferences from the relations and behaviour of the contents themselves. To assert independent existence or to deny it is equally to assign relations, causal or other, to the given content, and such relations are not given in the mere apprehension of that content.

Let us rehearse our description of the facts in order to see if there is any inconsistency. In fact (let it be supposed), in a given case the object *E* present to our apprehension is a fact external to our consciousness. Our apprehension *A* has the quality *E'*. Now, what constitutes the difference between *E'* and *E''*? Not the internal constitution of the contents, not their attributes or character, but certain relations in which they stand. *E'* is, according to our hypothesis, an element in a "material," *E''* in a mental, totality. On this question of the relation of the contents before it, apprehension has no business to decide. It therefore simply asserts *E* without considering whether this particular *E* be *E'* or *E''*, i.e. whether it has one set of relations or another. Further observation of the relations, comparison of one set of relations with another, and of the behaviour of *E* in comparison with that of *D* or *F*, lead us to the belief that *E* (say) is a permanent reality, that accordingly it remains in existence when we do not perceive it, and that therefore it is to be regarded as independent of our minds. All this is the content of judgment and the work of compared observations and inferences, as shown above.

In another case we apprehend *I'*, which is in fact internal. Here it is *I'* itself which qualifies the apprehending *C'*, and we are aware of what is in fact a state of ourselves. Still, as merely apprehending, we do not determine this. All we say

is "I," not "I'," and it is again comparison of observations upon the behaviour of I and similar contents which leads us to the judgment "I is merely a fact of our own immediate consciousness."

Thus the content of apprehension *quâd* apprehension is fact. But this is so merely because apprehension decides nothing as to the relations in which its content stands, or (we shall see reason for the phrase later) the totality to which it belongs. The white figure which I see at the foot of my bed on the stroke of midnight is a reality *quâd* apprehended. Either it is "there" or it is "in my consciousness." The important question Which? is decided by reflective comparison of its continuous or successive appearances with those of other phenomena.

Our position, then, may be summed up. Apprehension is always a definitely qualified state of consciousness. Its object may be its own quality or it may be an independently existing fact. Which is the case in any instance or class of instances must be decided by a comparison of different contents. In one case our reflective consciousness analysing the whole facts would decide that there is really an external fact present, that the apprehension is of that fact, and that the content of the apprehending consciousness corresponds with it. In the other, we should decide that there is no external fact present, and that the content asserted is in truth a qualification of the asserting consciousness itself, and only as such has any reality. Thus, as our result, an external order may be directly present to apprehension, otherwise such an order could never be known; but apprehension does not itself assert that the order given is external, otherwise apprehension might be false.

It will probably be objected here that in any case, if the apprehending consciousness is really qualified by the content it asserts, it must be as qualifying it that the content is really present, whence every apprehension in fact asserts its own quality and nothing external. This is really the objection answered at the outset. The content present in apprehension determines the quality of the perceptive act. The content present to apprehension is not as such an element in it. No assertion takes cognisance of its own quality because it is its quality, but takes its quality from the fact to which it refers. In simple feeling, where to be and to know coincide, this distinction falls to one of aspects. But this is only one case. Elsewhere the fact asserted is distinct from any element of the asserting consciousness in reality as well as in thought. All apprehension asserts is the presence of the content E or I. Further reflection may decide that this content existed only

within the apprehending consciousness, or that it exists apart from it. In this latter case a still further reflection shows that the apprehension must, as a mental event, have been definitely qualified in correspondence with its object E. But we can no more infer from this that what was present to apprehension, and what apprehension asserted, was its own quality than we can say that memory is an assertion of a fact now present. What has been called the "moment of reflection" shows me my apprehending consciousness with its quality on the one hand and the thing apprehended on the other. It does not show me that I apprehended a quality of my own consciousness, but rather that in this case an outer object was present to my apprehension, and this presence gave rise to its quality as an assertion. The existence of the content as qualifying the apprehending consciousness is, in short, as much an inference from the comparison of facts as its existence as an independent object. The mistake of natural or intuitive realism is to start with the assumption that the independence of the percept is immediately given;¹ the mistake of any subjective idealism is to assume that the object is first given as inward. To our view it is, in fact, not given as either. It is given as a content present to an inward state. Whether it is the kind of content which exists merely as a qualification of such a state, or whether it is such as to exist independently, is to be found out only by studying its behaviour and relations, and the conclusion is in any case a judgment depending on inference.²

¹ Cf., for example, Hamilton, *Lectures on Metaphysics*, vol. ii. p. 106: "In an act of perception I am conscious of something as self and of something as not self; this is the simple fact."

² It may be urged, that the subjective idealism which we have been combating is no longer held by any thinker of repute, and that the real question is whether the facts of perception and of knowledge in general do not postulate an eternal or universal consciousness as the subject for which alone they can be real. But the arguments urged in support of this view simply assume the position of subjective idealism as their premises, while they reject it in their conclusion. Thus, e.g., Green is constantly telling us that everything real is "determined by relations," and relations depend on an intelligence. "There must then be something other than the manifold things themselves which combines them. . . . With such a combining agency we are familiar as our intelligence" (*Prolegomena*, p. 31, and *passim*). This is why "Common objects of experience, . . . in the only sense in which they are objects to us or are perceived at all, have their being only for, and result from, the action of a self distinguishing consciousness" (p. 66). We might think this pointed to subjective idealism, but not at all. "But we cannot suppose that those relations of fact or objects of consciousness which constitute any piece of knowledge of which a man becomes master" (p. 71) cease to be real if he forgets them. "They must exist as part of an eternal universe." Here we seem suddenly to have got back to natural realism. What I know is something which is there for me to know, and is there whether I know it or not. But the very next words undeceive us—"and that a spiritual universe or universe

of consciousness." The "universe," the "unchanging order," is not independent of consciousness, for it is an "order of relations" and even if relations of any kind could be independent of consciousness, certainly those that form the content of knowledge are not so. As known, they exist only for consciousness, and if in themselves they were external to it, "we cannot conceive how they could get in" (p. 75). To put it shortly, things are proved to exist only for consciousness because they depend on relations, and relations "as known exist only for consciousness." But for what consciousness do relations as known exist? Unless your consciousness or the universal consciousness is given to me in immediate apprehension, clearly for my own (cf. Balfour, *Ibid.*, N 4, No. 8, p. 435). But then, how can related facts be taken as existing apart from me? You may say, "Oh, we abstract from your individual consciousness; relations exist apart from that." I quite grant it; but then I do not see how the universal consciousness comes in. In short, if you stand on the ground that relations (or reality as such, it does not matter which you take, are given as existing only for consciousness, you mean for my consciousness. If you do not mean that, your assertion has not the remotest plausibility. Having said so much, you can take your stand on what is given, and refuse to allow any abstraction at all. Then, you stick to my individual consciousness, and must deny any reality beyond it. Or you allow abstraction, and then you come to the relations or the reality existing apart from consciousness altogether. But by merely abstracting individuality you come, not to the universal consciousness as a great reality, but merely to a consciousness which is nobody's consciousness, and is not as it stands real at all, but a thin abstraction. And even so, why allow this much abstraction and no more? If relations can exist otherwise than as they are given, what becomes of your whole argument? It is really Berkeley's fallacy over again. You argue that the perceived can exist only as your perception. Then your inner sense of reality reasserts itself, and you admit that somehow the perception is independent of your perceiving it. But to save your first position it must exist for some consciousness if not for yours, and so the permanence of things comes to be their being in the mind of God. But when you have once admitted the content perceived to be independent of your perceiving it, you have leapt the chasm at which you halted at first. You have admitted that what you know is not as such a state of you or of your consciousness, and, having admitted that much, you have no right to argue that it must be a state of any other consciousness. In one word, can you perceive or think of a real fact which does not depend for its reality on your perception or thought? If not, your knowledge must be confined to your own mental history. If yes, you have on this ground no shadow of excuse for taking such real fact as existing in or depending on any other consciousness whatever, eternal or fleeting, universal or individual.

In such a predicament as Mr. Bouanquet's (*Essentials of Logic*, chap. i, p. 7-20), the idealist position is attenuated to the point of ambiguity. Take this sentence, "The world for each of us is our course of consciousness, looked at in that way in which it presents a systematic, organized picture of interacting objects, not in that way in which it is a stream of ideas and feelings, taking place in our several heads" (p. 16). Observe the position: my consciousness, my "self," is a conception which I have built up out of certain experiences in contrast with certain others. Subjective idealism held the contrast an illusion and identified the world with this self. Attenuated idealism admits the contrast, no longer identifies the world with the self, as we ordinarily understand the term, and yet reduces self and world alike to the "course of consciousness." What, then, we must ask, is this course of consciousness, for what is the world stand? Not for the "course of consciousness" which I refer to my own "head," which constitutes myself. For what, then? Why, says our passage, for the "organized picture of interacting objects." But are these a course of consciousness? Well, they are grasped by consciousness, i.e. they are known. In other words, attenuated idealism proclaims the truth that the known world is an object of knowledge. The reduction of all things to the course of consciousness is a mere expression for the abstract truth or

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truism that all the known world comes within the sphere of the knowing mind. But just here comes the danger. It is but the alteration of a preposition, or even of an emphasis, and this dull truism is converted into a weighty paradox. What is within the sphere of mind must be *in* mind, must have its existence in the medium of consciousness. With this we are back in something very like subjective idealism, we rest on essentially the same fallacy—that consciousness must in some way sustain in its existence the reality that it knows, that what exists for knowledge exists only by our knowledge.

The transition from the truism to the fallacy is excellently illustrated by Mr. Bosanquet when he tells us that the common-sense theory assumes a world existing "*outside mind*," and proceeds to refute it by showing that what is "*outside perception*" is "*out of our reach*" (*loc. cit.* p. 10, the italics are mine). Here is the whole thing in a nutshell: "*Existing outside mind*" means to common sense, "*existing whether known to exist or not*"; "*existing outside perception*" means, "*in a world beyond the scope or reference of perception*." That these two meanings coincide is the whole sum and substance of the fallacies of idealism.

CHAPTER IV

SUBSTANCE

So far we have been concerned purely with the negative character of the external order—its distinction as the not-self from our own feeling and perceiving consciousness. We have now to pass to its positive characterisation as matter or substance with powers and attributes of its own. Of course, the whole complex variety of its nature, resting as it does on the particular data of experience, does not concern us here. All we have to point out is, the manner in which these grand structural concepts are formed into which particulars are fitted. We have, in a word, to define and explain the terms just used—substance, power, attribute, etc. We shall discuss this subject under two main heads—that of the unity of various attributes in the thing, and that of the permanence of substance in the midst of qualitative changes. We shall try to show that our structural conception of matter rests on these two notions, that each notion is a definite and valid conception, and that its growth may be readily explained on the principles of knowledge which we have already admitted.

I. *The Unity of the Thing.*

1. According to Berkeley, a thing was a bundle. Several attributes, a certain odour, taste, sound, hardness, figure, and so forth "go constantly together," and from experience of their "conjunction" we come to believe in their universal and necessary union. We group them together in our fancy, and the group or bundle which we form of them is what we mean by a thing. I believe this description, after all that has been said against it, to be near the truth, and to fail mainly through being too abstract. I recall it here to illustrate by contrast the account which I believe to be the truth. Two attributes, on this view, are referred to one thing, not when they follow closely upon one another in a fixed order, but when they are apprehended as occupying one and the same space at one and

the same time.¹ Facts may be closely and constantly related to one another without being judged to form one substance. Thus a blow is followed by a pain, but the blow and the pain are not constituted attributes of one thing. The four walls of my room are objects that go constantly together, but they are not on that account conceived as one wall. On the other hand, the content white-shiny-cylindrical given by sight, and hard-cylindrical given by touch, are both referred to one single space, and form for me a single thing—the pen I at this moment hold in my hand. The thing, penholder, is that which is at once to sight and touch combined white, hard, etc. The attributes which constitute it do not follow one another, nor are they like any other attributes merely coexistent in space, but their coexistence is of a peculiar kind, they jointly occupy the same part of space. It is true that one thing cannot both be white and not white in the same time, space, and relation; but it is quite possible that it can be both white and hard in the same space and at the same time, and it is just this doubleness or multiplicity of character that constitutes it a thing and not an attribute.

Two opposite objections may be taken to this view. First, it may be urged that our conception is not specific enough. Any content, it may be said, refers different facts to the same space (for the future the words "at the same time" may be taken as written in this connection). Thus in the example of the pen, the visual perception taken alone contains different attributes which it refers to the same space. Thus white and cylindrical, or even white and shiny, are distinguishable attributes. Hence the visible character of the pen taken alone should constitute it a thing. To answer this, we must draw a distinction between attributes which we may name respectively concrete and abstract. A concrete attribute is, or may be, the full content of an individual act of apprehension. Thus the visual perception of my pen presents it to me as shiny-white-cylindrical, etc. This is its visible character, and may form the content of a single act of apprehension without the addition of further elements, and its visible character is a concrete attribute of the thing. On the other hand, these terms, white, shiny, cylindrical, etc., are each taken severally abstract attributes. They are marks of the concrete attribute,

¹ Cf. James, vol. ii. p. 183. Professor James seems to think, however, that the mind effects the unification. I cannot think that this is so, or that the "great intellectual law of economy" has anything to do with the case. I cannot see that it would be economical to impose a unity on contents not given as one. And I can only suppose the statement that "Whatever sensible data can be attended to together we locate together" to be unintentional.

elements in the actual given content as it is apprehended. They cannot, any one of them, ever be apprehended by themselves. Each one of them may be conjoined with quite different elements in any other given content, but they must always be given conjoined with something. We never see a colour that is not extended, nor a "shine" that is not a shine of some colour, nor a colour that has not some degree of shininess (luminosity), and so on. Now, a thing is constituted by the reference to one space, not of abstract, but of concrete attributes; not of the elements of a single apprehended content, but of the contents of what can be, and in other cases are, separate acts of apprehension.

2. It may next be asked how we can know this fact of co-existence in a single part of space? There can be only one answer to this, namely, by direct apprehension. When I press the table with my finger, and at the same time look at it, attending to both facts at once, my total perception is of a coloured-hard-surface in contact with my finger. I may doubtless shift my attention so as to consider only the visible aspect of the table and its relation to other points of the field of vision; or, again, to contemplate only its tangible properties. But I can also attend to both facts at once, and they then form for me a single given content in which the identity of the attributes, their existence in a single part of space, is an element.

This view would seem less strange if a habit had not arisen among thinkers of describing a sensation as being "referred to" a given place, as being localised by the perceiving consciousness. This language suggests the wholly unwarrantable view that the sensation *qua* sensation has no locality or position, that it is originally "given" to the mind positionless, and the mind assigns it due position. This notion is applied to bodily feelings as well as to optical sensations or sounds. Thus I am said to "locate" a pain in my left leg, or a sound to my right, as though the pain or the sound turned up in my mind as a detached kind of article which must be put away somewhere, and gets sent to my leg or to the next room because those are the places I happen to have unoccupied just now.

As long as we regard two sensations, one, say, of sight and one of touch, as "given" spaceless and positionless, and "referred" by some act of intellectual synthesis, or what not, to their positions in space, a difficulty would certainly arise when we come to the question how two sensations of different kinds apprehended by means of different organs come to be referred to the same point in the same space. There seems, indeed, no manner of reason why a positionless unextended

content should be referred to any position at all, much less to the same position as some other. If, however, a sensation as given is extended and has position, if the position is a part of what is given, then there is no question about the psychological nature or logical value of the assertion of that position. It is simply a part of the act of apprehension. And this being understood, there is no more difficulty in supposing two contents apprehended in one space than in apprehending them in continuous contact or at a distance of two feet. The total content in such cases is, in fact (*e.g.*), "hard-coloured-surface" or "single surface hard and coloured" given in a single apprehension; not "hard-there" in one act, "coloured-there" in another, and "first there = second there" in a third. Such at least is the basis of this perception of unity. That, the basis once laid, it may also in any case be "constructed" by three separate perceptions we may also admit.

The difficulty here is in fact physiological or psychological, not logical. In logic the given is ultimate, in psychology we may have to ask how the given comes to be given. Thus in the present case we have assumed that the eye and the finger-tip can identify a portion of space, and through it an object, that I can "feel"—as a matter of immediate sentience—that the object which I see about eighteen inches from my eye is also the object which feeling locates at the end of my finger. At first sight, indeed, the whole thing might seem a question of sight. For you see your finger, and see it in contact with the coloured surface, and so "of course" it is that surface which is the seat of the hardness that you feel. But why of course? Two things at least are involved here—first, that the hardness felt is felt as in contact with the finger. This may, I think, pass as a true analysis of the fact of tactual feeling. Second, that the finger-tip of your vision is the same as that of your feeling. But why this sameness? whence comes it?—only from the identification of the positions of the feeling and sight of my finger. Which brings us back to the same point, namely, that perception *as it stands* in the developed man gives us space relations identical or diverse, as the case may be, between the contents of vision and touch; in short, as it is sometimes put, that the space of sight and touch is one space.

Now this identification certainly raises a psycho-physical question of great interest. The nervous affections, that we must suppose as intermediaries in visual and tactual perception of the same object, are very diverse in origin, and presumably in character. In the one case the physiological disturbance starts with the fibrils permeating the skin of the finger-tip; in the other, with the rods and cones of the retina. How physiological

impressions so distinct in origin should come to give impressions with any element of identity is certainly a puzzle. Nor does the relation between them appear to be a pre-established harmony. Babies in the first two or three months of their existence, when they begin to "take notice," seem to make no connection between visual and tactual perception at all. They grasp what is put into their fingers, they follow with their eyes any chance object that interests them, and they suck anything put into their mouths. But they do not integrate these three worlds of perception. A distinct step forward is taken in the baby's education when he looks at the thing he holds in his hands, and then unfailingly carries it to his mouth. This stage is followed almost immediately by the attempt to grasp what he sees, and the absurdity and awkwardness of the first efforts in this direction show how inadequately the spaces of hand and eye are as yet integrated. A baby not only makes bad shots at objects within reach, but grasps quite confidently at distant objects—crying for the moon is only an extreme instance. We must therefore admit that the identification of the spaces of different sense organs is an educated perception.¹

Nevertheless, it is a perception still, and as such for logic a primitive fact. This is no isolated peculiarity of the perception now before us. Not to go beyond sight itself, we have a parallel distinction between the logical and psycho-physical points of view. The paper on which I am writing is given me as a continuous surface, but the mechanism by which this perception is effected is the stimulation of a vast number of separate nerve endings in my retina. What is the physical or "psychic synthesis" by which these separate stimuli produce a single continuous sensation? That we do not know, but two things are clear—that the physical unit is the stimulation of the single nerve ending, and the mental unit the perception of surface which is due to countless stimulations of countless nerve endings. In building up our knowledge of the world we start from the mental unit. In physiological psychology we start from the physical unit. Admitting, then, the psychological difficulties of the existence of the perception of identity on which our theory rests, we have still to stick to the fact of that perception, and to start from it as the basis of our knowledge of things.

3. The identification of concrete qualities is peculiar in its results no less than in its genesis. It makes us further qualify an

¹ As a further analogy we might point to our sound-space, which for most individuals is never very accurately measurable in terms of sight and touch. Here again the well-known powers of the blind show the effect of careful attention in educating discrimination.

already apprehended content. When I analyse a given optical appearance and say it is rhomboidal in shape, crystalline in appearance, etc., I am analysing out by simultaneous or successive acts of attention the several abstract qualities or elements of the apprehended whole. I am not assigning some further quality to that whole other than is given in the apprehension of it. Again, when I judge A before B, or to the right of C, I assert relations of A but not qualities, i.e. characteristics given by attention to A alone. But when I add to the seen crystalline shape the perception of hardness, smoothness, sharpness, a certain weight, coolness, etc., I am further qualifying the content first given. These new facts do not merely stand in relation to the first fact, but are qualities of it in the sense above assigned to that word of facts discernible by attention to the content itself. Of course, we may invert the process. The visual may be said to qualify the tactual content, or vice versa. All I want to bring out is, that in this case the one content is the other—not merely is related to it, but is it. If we try to make this "is" a little more precise, we may put it that the two contents which I will call V and T have the common element P—the position they occupy in space and time. Now, any comparable contents have a common element in a certain sense, namely, their generic character, but this common element is a name for their similarity, or, if you prefer it, for the two elements, one in each several content which are precisely alike. There is no numerical identity. Here there is such identity. The same portion of space and time is given in the two contents, and that is their precise ground of union. They are one as to a portion of their composition.

But what, after all, is the thing—is it the one attribute or the other, or the space in which they are? Or is it, again, none of these, but a mysterious something that "is" all of them or manifests itself in all? The first two views are clearly out of court at once. As to the third, we no doubt (on sufficient general grounds) believe that there is more "in" things than meets the eye or all the other senses together. But we cannot admit that this possible more is the thing to the exclusion of that which we do not surmise but know in it. The perceived contents themselves, as united in a single space, in the peculiar union constituted by that fact, make what we know as the thing. When I say, "The thing is that which is at once hard, round, white, cold, dull-sounding, acid," etc., I do not mean that the thing is some fact other than the union of these attributes which determines or possesses them, as I possess my hat or determine my line of conduct. I mean to name "the

thing," this list of contents, in the form of union above described. This whole so united, then, is the thing, each part its attribute.

Note two things further. Any attributes, whatever they be, found in one space are referred to the same thing, and there cannot be two things—though there can be many attributes—in one space. Certain classes of attributes exclude one another, and hence are called contradictory. It is contradictory attributes which a thing cannot have at the same time. It being understood that a thing can have any other attributes together, it will be seen without difficulty that whatever attributes are simultaneously presented will be referred to one thing.

It might indeed be taken as the differentia of a thing that it is that which excludes from the same space all contents except those which form elements in itself. And if we suppose a person confined solely to the sense of touch, this would perhaps be the only notion of a thing that he would have. It might, however, be questioned whether he could then be said to conceive things as we do at all. In any case, whatever the definition, the total character of things is, we believe, such as is described above.

II. *The Permanence of Substance.*

4. The question, "What the Thing is," which we have already found difficult enough, is still further complicated when we take into account, what we have hitherto neglected, its duration in time. The further subtleties and difficulties here arise from two sources, the empirical observation of the changes undergone by the thing, and on the other hand the apparent intellectual necessity of referring all changes to some permanent existence which we call substance. We will consider this abstract need first, our object being to show precisely what is postulated on this head by our intelligence, and why.

In our notion of substance, apart from the ideas already considered, there appear to be three elements that are constant and pretty clear, along with one that is fluctuating and uncertain. First of all, substance is the permanent in reality; it is that which neither comes into being nor ceases to be; it changes in the sense that it is the subject of change, but is not itself increased or diminished. It is the string on which the variegated row of phenomena are strung. Secondly, substance is contrasted with attribute, state, event, relation, etc., as that which has independent reality with that which can only exist in something else. The attribute must be an attribute of a substance, the event must in fact be a change

in a substance or substances, and so on, as we learnt from Aristotle. True, this distinction becomes imperilled when we ask with Locke what then this substance is which is to be distinguished from every attribute—from everything that could make it anything. And if the point is pressed, substance threatens to turn into a being which is not anything in particular—a conception which will be rightly dismissed by Berkeley as “the most abstract and inconceivable of all other,” and correctly proved by Hegel to be in fact indistinguishable from nothing. That which is nothing in particular is nothing at all. This second conception, however, may have derived some help from the third point, which is, that substance, as existing independently of other facts, is self-subsistent, and in this self-subsistence we find the ground of its permanence. Now, can any meaning be attached to “self-subsistence,” or is it but another name for that *causa sui* which Schopenhauer tells us to be a mere Baron Munchausen, lifting himself horse and all out of the river by his own pig-tail?

If a complex set of facts $\alpha\beta\gamma\delta$ is the true cause of a second complex $abcd$, we have seen reason to hold that $\alpha\beta\gamma\delta$ must pass continuously into $abcd$. Whether directly or through intermediate stages, the first group of facts becomes the second. This is sometimes expressed by saying that the cause and effect are the same thing in different aspects or in different phases. There is an element of vagueness in this expression which appears when we ask what is meant by the “same thing.” What sameness is there between the antecedent and consequent? *Prima facie* there is a total change in every particular, and the only sameness that appears is not a qualitative likeness, but that very continuity which was our starting-point. But let us slightly alter the case. Suppose the universal relation with which we started to be, not a change $\alpha\beta\gamma\delta - abcd$, but a state of quiescence $a - a$, or $abcd - abcd$, there is here a true permanence of quality: the same character of reality a persists through the two moments of observation. Here, then, is a complete identity. In $abc - aby$ a partial identity. But in either case there really is something the same in the antecedent and consequent. And looking back now to our first case, $\alpha\beta\gamma\delta - abcd$ are so far the same that both are real. Some thing, some reality, persists through the two stages.

Now we may have persistence without determination. Just as a change b may follow a without being the effect of a , so an unchanging attribute a may persist, but only in dependence on other permanent facts. The blue of the sky has lasted so

many hours, but all along in dependence on a complicated set of meteorological conditions. But reverting to the case above, suppose the first α determines the second α , i.e. not only persists but determines its own persistence. Here, then, we have what we may fairly call self-subsistence, a permanent fact resting upon no further conditions, but at each moment of its existence determining its own continuance through the next moment. In fact, in the relation $\alpha - \alpha$ we have a self-subsistent identity, just as in $\alpha\beta\gamma\delta - abcd$ we had what we may call a self-determining process. We may give it this name, because, looking at the process as a whole, the first stage becomes the second without further conditions, undetermined by anything outside. And now, comparing either of these relations with the fact α or the relation $\beta - b$, we observe a contrast. The consequent α cannot exist without the antecedent α and the concomitants bed ; ¹ the relation $\beta - b$, does not occur except in company with the other relations $\alpha\gamma\delta$, acd constituting the whole process. Thus the self-determining whole, whether a process or an identity, exists independently of other conditions; the element in the whole depends on other conditions. The whole, then, has independent existence; the part depends for its existence on the whole. Briefly, the self-determining, whether changing or identical, has independent existence; and is so far *substantial*. What is not self-determining is dependent on another; it is unsubstantial, and must be an element in a self-determining whole.

But now, as we have seen, the term substance, in addition to "independent existence" and "self-determination," appears to contain the notion of continued identity. We have seen that such a notion *would be* realised if we found a content A persisting independently of all conditions external to itself. Such a content would have the attribute of eternity commonly attached to substance, being (in accordance with the universality of the uniform sequence) destined to propagate itself forever, and so to be without beginning or end of days. But the question is, where can this Melchisedek of reality be found? Or rather, for our present purpose it will be enough to inquire whether, without special experience, we can infer anything as to the existence of a substance from the general principles of thought. This much, I think, can be said. We have a cause α which, in conjunction with b , has an effect α . We have seen that its effect must, in the last analysis, be exactly alike in all cases. And thus this much at least will be clear, that it cannot

¹ I.e. supposing $\alpha\beta\gamma\delta - abcd$ to be what we have intended, a whole in which the elements are interdependent.

in any instance be followed by no effect at all. It must always be followed by some whole, in which its own effect is this or that element. And a whole constructed of real elements cannot be a nonentity. Any cause, then, must have some reality as its effect. Further, if the effect $\alpha\beta$ is produced by a acting on or with b , there are two possible cases. Either $\alpha\beta$ is a permanent state, which therefore remains constant until meeting with some further source of change γ ; or it is a process in which β continues to act on α (just as b on a) to produce yet another combination AB . But in neither case can it be reduced to a nonentity unless we admit that the sum of two elementary effects, i.e. the sum of two realities, amounts to pure non-being. For at any point in the sequence, from ab onwards, if there is an element x persisting unchanged, this element can only be modified by the changed concomitant y , or by some altogether extrinsic change z . And since in any case the element R , some reality or other, persists in the first effect $\alpha\beta$, that element could only be destroyed by combination with the changed effect, or effect of that effect. But this effect r , again, must at least be something real. And the combination of the two real elements R and r cannot give us pure nonentity. That is, every self-determining process, whether changing or not, must maintain this one bare element of identity at least, that it maintains its existence as a process without end. Just as (by the law of the ground) it must have antecedents without end, so it must have consequents without end, and it appears therefore as an unending, self-maintaining stream of reality.

Now, if we take any chance fact x , various alternatives present themselves as to its origin and maintenance. It may, for example, be a mere expression for the total character of a "casual" collocation; or it may be an attribute depending on a collocation. But whatever it is, it must have some total and sufficient ground in reality, and that will mean that it must belong to some self-determining stream of existence such as we have described. This is the harest and most abstract meaning of the inquiry after a substantial reality to which a fact belongs. We have not got the total ground of anything until we have found a substantial, i.e. self-subsistent, reality.

5. We have generally spoken in the above discussion as though certain definite facts, or groups of facts, could be found which would form the completely self-determining streams of reality of which we were in search. But this language is open to some misunderstanding—a misunderstanding which lands us in

the conception of separate things, each of which has real being (i.e. completely independent existence—*κατ' αἰρέ*), and the interaction of which then becomes a kind of miracle. To explain; if a reality A is completely self-dependent, and it is this self-dependence which is really in view in ordinary thought when real being, which can neither originate nor disappear except by miracle (i.e. in an unthinkable manner), is attributed to A, then, indeed, it is a flat contradiction that anything else should act upon A so as to modify it. And thus the natural exaggeration to which thought is liable is forced in the assertion of substantial things which exhibit changing states in response to the action of other things to contradict itself. For, on the one hand, the state is held to have its real existence in, i.e. to be in the completest manner dependent on, the thing which it qualifies; while at the same time it is supposed to be caused in that thing by the agency of something else. As against this confusion we must make two points clear. First, if, and so far as, any fact A is completely self-determined, then that A is never modified, but always remains A. Secondly, if no such fact is found, the ultimate self-determining reality to which we are finally referred will be no finite being, but nothing short of reality as a whole. And there is no intellectual necessity of which I am aware that can decide which alternative will in the last resort be found compatible with fact. We must have some substance, but that that substance should be anything less than the whole of things can only be proved, if at all, by experience. This limitation only must be kept in mind when we are tempted to deny substantial character. The fact that a content C acquires characters p and q, or loses qualities r and s, or even that it changes to C' or c, is not conclusive against a hypothetical "core" of substantial reality r, which is persistent and therefore truly self-determining in all these changes. In the conception of an element of self-determination r giving evidence of itself on the one hand by preservation of its own identity as a qualification of every phase into which it passes, and on the other hand by its definite and specific interaction with other sets of facts with which it comes in contact, we get the ordinary "thing" or "substance" which experience tries to find. And we have room here, lastly, for a certain relativity in our conception, of which thought certainly avails itself. An identity may persist under certain conditions, maintaining its character and contributing to the determination of its changing states in accordance with fixed laws as long as those conditions last. Here we have a substance which "holds together" on certain conditions. Only in our search for what is really, i.e.

ultimately, and under all conditions, substantial we are pushed further and further back.¹

So far, then, we may conclude that the doctrine of substance means that every fact is, or is referable, to some self-subsisting fact or set of facts, that such facts are unconditionally permanent in the sense of forming an unending stream of existence; that this stream may be qualitatively identical throughout, but may also be a process of continuous qualitative change; and lastly, that from the bare maintenance of reality upwards all degrees of qualitative identity are possible for it, and such a whole—though in any case self-subsistent—is practically recognised as substantial with a readiness and certainty proportioned to the definiteness and importance of the qualitative identity maintained. Lastly, self-determination is not, of course, exclusive of further determination from without, as long as the two determinations are mutually consistent. The whole $\alpha\beta$ may have $\alpha\beta$ as its necessary consequent; but this does not debar $\alpha\beta$ from taking to itself any further quality γ not inconsistent with α or β . And so our inquiries into the causes of a given change normally divide themselves into a search for an explanation within the substance itself (as when we trace the character of an organ to permanent conditions of the evolving organism),

¹ The above discussion so far follows Lotze (*Metaphysic*, bk. i. "Ontology") as to agree in the final resolution of the "causa transiens" into the "causa immanens." You cannot have completely independent Herbartian "beings" which yet interact. But it remains an open question whether there may not be a plurality of what we might call fixed centres of being, as long as we understand that these centres do not form concrete wholes of reality, but only fix certain elements in such wholes while they admit of change in the remaining elements, and contribute by interaction with other fixed points to determine the character of those changes. Thus an element A in a whole AB might be self-determining so far as to maintain the character A, but might so interact with C as to change B into D when C is present. There is no need to maintain that its own persistence as A exhausts, as it were, the whole active capacity of A in relation to other facts. More generally, we may say, there is a clear distinction between the whole in which an effect appears as an element and the other causes contributing to that effect. The first is *in primis* (sic) the substance to which the new attribute belongs, the second, the external, operative, or "efficient" cause. In reality, the effect must be the true result of both, i.e. that which taken together, and so far as interacting, they become. This is unintelligible if the effect is taken as having its whole being, i.e. its complete determination, in the totality which it qualifies. But it is not unintelligible that such totality should partly determine it, the remaining conditions being supplied from another "thing." Partially or conditionally self-determining things, then, are possible; and I may add that my own view would incline towards asserting the first, while the second I should take to be empirically established. Lotze seems to admit the possibility of this view, but to incline against it (*Metaphysic*, bk. i. chap. i. § 24 ff.). I need hardly add, that the independent thing would not be independent of the whole of reality, i.e. prior to it, and a condition of its character, but only an independent element in the whole, i.e. not susceptible of modification by other elements. This follows clearly from Lotze's admirable discussion, to the whole of which I must express my obligations.

or in the action of some other substance in some one of its phases on the particular substance which presents this change.

6. If the blank form of the doctrine of substance can be drawn out from the principles of reasoning, its concrete filling is arrived at in a very different way. We find in our experience, persistence amid change; we find that those totalities which we have already called things, while they change in some respects, persist in others, and, in accordance with our ordinary inferences they seem to be, in part at least, "self-determining," both as to their persistence and as to their change. These apparently self-determining totalities, admitting of change yet preserving some elements or broad outlines of character, form the things or substances of everyday life. To these "empirical" substances it is not necessary that their "self-determination" should be complete. Self-determination may clearly be a matter of degree, for the more nearly a thing contains the whole of the conditions of its persistence or change, the more completely will it be independent of other things. Now, ordinary "things" are so called, and have substantial character attributed to them, in virtue of an apparent self-determination. In so far as this self-determination is real, the attribution of it will be justified. But, short of completeness, we may allow the name of an empirical substance to any whole which we are warranted in supposing to contain the main *positive* conditions of its own persistence,³ and to contribute to the determination of the changing phases through which it may pass. Such empirical substances make up a great part of the framework of experience.

Our definition, it will be seen, does not require that all the attributes of such substances should be wholly determined by the character of the substance as such. On the contrary, we expect to distinguish in any given totality those which belong to the substance itself, and follow from its antecedent condition

³ Any whole A will, according to our usage of terms (see above, Pt. II. Chap. XVI.), contain all the positive conditions of its own persistence if it continues where no concomitant B or C has any element a in A as its effect. It may yet be destroyed if it meets with a force D which has as its effect a change in A. That it should not meet with any D will then be a negative condition of its persistence. The word "main" is somewhat vague. I have in mind two cases—(a) when the thing contains the sum of the positive conditions in question—thus I suppose a stone tends to remain a stone if nothing acts upon it to make a change, and (b) where the "thing" maintains itself by interaction with other things—e.g. an organism. These other things are, then, conditions of its persistence (e.g. food and air), and, in a way, are positive conditions. But there is a clear tendency, in the higher phases a conscious effort, on the part of the organism to interact with them in such wise as to maintain itself. On this account the organic character should, I think, be reckoned among the substantial characters of a plant or animal.

as a new phase, from those which are temporarily induced by the action of these substances. Thus the permanent qualities of a solid object, its extension, its occupancy of space to the exclusion of other objects, its weight, its hardness, its smoothness, all form part of the substance proper. Its temperature, its resonance, and perhaps its colour (or at least certain characters of its colour), are attributes for the time being dependent on the action of other substances upon it. So, again, the various features or phases of the developing organism belong to its character as a substance, so far as they follow a regular evolution. So far as the development varies in an individual case, we attribute the deviations (in the absence of other indications) to the action of the environment.

Two points, however, deserve notice here. First, the action of the environment may permanently affect the substance, so that the results of each affection become part of the substantial character. Secondly, the temporary attributes so far belong to and indicate the character of their substance that they imply an antecedent capacity for that particular reaction which constitutes the attribute. This capacity is to us, in the absence of experience to guide us in the matter, a mere abstract expression; but it must really involve some positive attribute apprehensible in the thing. So far as, *e.g.*, "secondary" qualities have been traced to "primary," we are able to form a concrete notion of the nature of that permanent state of the substance from which in reaction to outward agencies the attribute from time to time issues. These capacities are therefore important in filling up our notion of the substance, because they form the larger part of its *permanent* character. The substance is not only this or that sensible content; it is also that which will do so and so, be such and such, on the appropriate occasion. It is so far, and only so far, as these permanent capacities or powers are concerned that there is something abstract, indefinite, and general, though necessitated by the principles of inference, in our conception of substance.

Lastly, the identification of the permanent substance, with the totality filling a given space at a given time—an identification which we have assumed all along—is a result purely of experience. Every substance, we find, presents us, or is capable of presenting us, with many perceptible contents in one moment. It smells and sounds and feels. Conversely, no attribute is self-dependent. It belongs always to a whole; its relation to this whole is, according to our experience, universal. Hence the attribute cannot be independent of the whole, and in the whole its substance must be found. We cannot have a

blue that is not a blue dress, or a blue eye, or a blue something. A substance, then, is always the total reality present as a given space at one moment, and presenting many attributes as contents of distinct acts of apprehension.

Now, these empirical substances are yet imperfectly substantial. Permanent under certain, perhaps under normal, conditions, they change or disappear under others that may be common or may be exceptional. The tree which grows and puts out leaves and blossom, which slumbers through winter and wakes to new life in spring, is such a permanent substance, the subject of change, yet withstanding its attacks. But even the immemorial elm perishes at length, when its full time is come, when its elements, in their interactions with one another, and with external things, have become so modified that the vital bond no longer holds. Then the tree is gone—dissolved into its elements, which therefore remain.

Now, what of these elements themselves? Analysis pushes us further and further back. The wood of the elm is not everlasting—any of its component substances may be resolved by chemical analysis; and, finally, the facts of that analysis compel us to treat the substances which it uses as elements, as being themselves compound—as consisting of molecules, which again are built up of separable atoms. The atom is the hypothetical goal and starting-point of this line of thought. It is the alleged indestructible to which analysis must lead us, and which by its multiform interactions produces the play of concrete existence.

Scientific analysis, in fact, tends to take "substance" and "element" almost as interchangeable terms. But however this may be as a matter of experience, it does not necessarily follow from the definition at which we have now arrived. By that definition the substance is the self-determining and therefore permanent stream of existence. If, then, we get any kind of totality which thus determines itself, we have in it a form of substance which is yet not elementary. It is quite possible that the elements of such a totality may shift and change; the only limitations here necessary being that either the permanent character of the totality should be such as to admit of changes (as in a developing organism), or that new elements should be always ready at hand to enter into the totality and take the place of the old ones. But wherever we have a system of facts with a definite character as a system, which character determines the mutual relations of its elements, and gives its due place to each new element that enters into its composition; and when such a totality perpetuates itself, then

we have a substance of a composite character. There is, moreover, no reason why such a substance should not be as permanent as an elementary substance, but with this proviso, as it would appear, that there should be either a permanent equilibrium of its elements (as in the relations of the molecules of a solid, which have only a regular movement about their centres of gravity), or a continual supply of fresh elements ready to take the place of those lost to the totality, as in the relation of the organism to its food and waste. There is, then, nothing to prevent us from conceiving a compound substance persisting indefinitely, only the conditions of such persistence would seem to be complex in proportion to the complexity of the substance itself.

As experience reveals the fleeting character of our first substances, the contrast above explained between "substances" and "substance" may be said to arise. The theoretical elements in this second conception we have tried to explain, but what actual content may be said with certainty to realise them is a question for experience which we do not here attempt to determine. The idea of substance is one of those underlying conceptions which are at once the postulate and the goal of science, but which are only reached with more or less certainty, according to the success of our inductive processes.

Meanwhile, for the purposes of ordinary knowledge, any whole stands as a substance which preserves, or tends to preserve, its character, or to run a certain course of change under certain negative conditions; and if in any case (*e.g.* with matter proper) we have no experience of any alteration in its fundamental properties (*e.g.* weight, impenetrability), then a suggestion of a change in such respect will be one of those unmotivated possibilities which we found to coincide with grounded impossibilities. That matter is permanent will then be a law resting on experience, to be distinguished from the axiom that substance is permanent. Such a law will be the limiting case of empirically established permanence holding under all conditions known or imaginable. But short of such a true substance we may have wholes of shorter lives, which yet so far act as substances, and so far deserve the name, that they fix their own history, including, perhaps, their own dissolution, within certain assignable limits. Such wholes are the concrete things or substances of experience.

7. If we are asked now what any given thing is, we may return a wider or a narrower answer. We may say that the thing is not any part of what it is, but all that it is; and if it

be objected that this is as tautologous as "eggs are eggs," we shall reply, that we intended the tautological form as a gentle rebuke to the question for putting itself in this shape. A given thing is a name for a whole mass of facts of perception causally interconnected, and persisting or changing in definite ways through time. If we were asked without qualification what the thing is, it is this whole extended in time, but tending to a narrower concentration in space. If the term "is" receives a temporal significance, we are led to a second answer. For we must now take into account, not only its apparent sensible qualities, but also all those which can, perhaps, be only hypothetically assigned, in virtue of which it has been this and will be that—all those "capacities," in short, which determine its various reactions. And in this totality we get at the kernel of relatively, perhaps absolutely, permanent reality, which constitutes the "thingness" of the thing. And if this is what our question wants to arrive at, we must give it this second answer.¹

Another very pretty question may be raised in this connection as to what constitutes the identity of the thing. When are this and that the same thing, and when different? On this we have only to remark, that two very different ideas are involved in this question—those of continuity and likeness. The fullest conception of the same thing is completely satisfied only by both. That only is fully one thing which is self-determining, and which determines itself to be identical in character. But we have seen that both these conceptions are only partially realised in any ordinary group of facts which we call a thing, and how much we are to demand of either becomes a question of degree which can only give rise to frivolous conundrums. Our discussion will have suggested the view that of the two ideas, that of causal continuity is the really more essential; but when all qualitative likeness is gone, the continuous whole seems more correctly spoken of as a self-determining process. What degree, then, of causal continuity and qualitative resemblance is required for sameness of the thing becomes a purely arbitrary question. Even Sir John Cutler's silk stockings, which were darned until they became cotton throughout, might be called the same, inasmuch as the change was continuous and the purpose identical throughout. A pipe belonging to a friend of mine, which had first its mouthpiece

¹ Here, again, I do not materially differ from Lotze's definition of the thing as the realised law of its states—understanding this expression as he explains it—in a concrete sense (see *Metaphysics*, bk. i, chap. iii, § 32 ff.). I only point out that the total behaviour of the thing as partially dependent on other "things" is a slightly different conception from its own law, as expressing such element in its behaviour as depends on itself from moment to moment.

renewed, then the bowl, and lastly the joint connecting them, would present a still more knotty problem to this line of thought. The question "Was it the same pipe?" may be left to those who interest themselves in the question, how much a lot means, or at what moment you become a man.¹

I conclude that the reference of contents to a substance is a matter of intellectual necessity; that a substance is a self-determining continuum, and therefore maintains itself perpetually; that it may be composite or elementary; that in its independence it may or may not be qualitatively identical in part or altogether; and that it presents many aspects in one space at one time partly determined by its own nature and partly in response to the action of other substances. Any whole fulfilling these conditions is a substance; and reference of a fact to a substance is the assignment of it to such a whole. Whether any such substance can be said to exist short of the whole of reality is a question which can only be answered by experience. But experience forms conceptions of things or substances which deserve that name in so far as they contain the positive conditions of their own persistence together with the further characteristics above specified.

¹ The sameness of the thing is as unimportant as the sameness of the person will be more and more clearly seen to demand more accurate definition. Whether this is the same chair after it is mended matters to no one. Whether this is the same man, who was a criminal and is now a reformed character, is a far more vital question, going to the very root of ethics and criminal law. It is clear enough that responsibility goes along with identity, but how far do these extend? Ordinary common-sense judges them by mere continuity, and this the superficial physical continuity of the body. But within this continuance not only may there be immense changes of qualitative character, but the streams of causation may be so broken up that there appear to be rather two "personalities" than one. The questions arising from this fact will be touched on in the next chapter; but their serious consideration is a pressing matter rather for ethics and psychology than for our purposes.

CHAPTER V

THE CONCEPTION OF SELF

FROM the problem of substance we pass to that of self. An analogous set of experiences and a similar intellectual necessity partly provoke and partly baffle each inquiry. In ordinary thought we refer qualities presented to our five senses to this or that material thing; and in just the same way we attribute feelings, emotions, ideas, beliefs, and the like, to the self. What, then, is the self? What postulate of thought or what product of experience is covered by that term? Do feelings and the like form any sort of intelligible whole; and if so, is it a connected, and is it a self-determining whole? What answer can experience give us to these questions?

1. Before we attempt an answer to this question, we must establish our right to ask it—to ask it, that is, in the terms which we have used. The self, it may be said, is known, not by or from experience, but as the postulate of all experience. For when we speak of experiencing or, in detail, of apprehending, remembering, inferring, this or that, what is it, we shall be asked, which apprehends, remembers, and infers? There must be a subject which does all these things, which has all these states just as truly as these things are done, as these states have contents. To the object that we have been treating all along there must be a correlative subject, and that subject is the permanent self. This conception, then, is not learnt from experience, but is implied in experience itself.

To this we have to reply that, so far as the conclusion of the argument is concerned, we have little quarrel with it. We, too, believe that there is in some sense or other a permanent self which is the subject of all knowledge, and that this is implied in the facts of knowledge themselves. But it must be remembered that to find out what is in real truth implied by a known fact is not always an easy matter, and whether easy or difficult postulates in its turn certain methods of attaining

knowledge which must be sound if the result arrived at is to be true. What is really implied, say, by a given phenomenal effect must really exist or have existed whether we know it or not. But that we may know what it is, we must have certain logical grounds to go upon. And so it is with the subject of knowledge. If such a subject exists, from what data and by what methods do we come to know it? When we say it is implied, what is the logical character of the implication? How, in short, do we prove it? When we say, "there is a subject of knowledge," the subject has *pro hoc vice* become object to us. It is an asserted content in its turn, and on what grounds do we assert it? Here, in general, I can only adhere to the position maintained throughout this work, that apprehension and judgment or inference drawn from facts given in apprehension constitute the only safe ground for this or any other assertion. And I can only therefore conclude that the subject, if it is to be apprehended at all, must in its turn be given as object. Whence I conclude that any conception of the subject and its nature is derived, as we said at starting, from experience. We might be subjects of knowledge, and remain such to the ding of doom without ever being aware of the fact. And we should be and remain in that position if the fact of our subjective activity never became matter of apprehension.

The view that the subject must also be object has seemed to some people an inconceivability, and to others—perhaps, on the *credo quia absurdum* principle, for that very reason—the crowning mystery and sublimity of all that is. But the mystery rests in the form of statement rather than in the facts themselves. That this particular fact should be at once subject and object at the same moment, and in the same relation, would be, no doubt, a contradiction deep enough to bring joy to those who take pleasure in such things. But that one act of thought, itself a true "subject," i.e. an act of reference to an object, should in turn be thought of and so become object to another act, is no more a contradiction or a difficulty than that this line, which is below the top of the page, should be above the bottom. Let us briefly state the facts. I perceive a content—say, that foxglove. A moment after I may recollect either (α) that the foxglove was there, or (β) that *I was looking* at the foxglove. In the first case, I remember the given content—the object. In the second case, I remember an act of perceiving that object. That act I call the act of a subject, a subjective act, and I find that it stands in a definite relation, refers in a definite way to its object. Thus I have now a second object which includes in it the first *plus* that act which was in the first

instance the subject.¹ I may, then, generally think of an object and think of that thought. The first thought subject to its own object is object to the second thought. But the two thoughts remain two, and must not be confused. The thought of the object is not the thought of itself. You may think of an object, and then think of that thought, and then think of *that* thought, and carry on this game *ad infinitum* if it amuses you, but in every case the subject thought, when it becomes object, requires another thought as its subject. There is never in this sense a subject-object.

If, then, we agree that a subject is implied by knowledge, we, for our part, rest this belief on the ground of experience. The conception of object-for-subject is a conception found in our experience, the two terms forming the correlative elements which we analyse out of certain given wholes. And every conception we have of our own knowledge, perception, beliefs, etc., being formed on this basis, it is clear that the two conceptions are implicitly contained when not clearly expressed in the notion of knowledge.

But our present conclusion does not take us far enough. Knowledge, it will be said (and here again we agree), involves not merely a subject but a special kind of subject, namely, a permanent subject, and this permanent subject will be the self which we require. But here we must draw a distinction. "Subject" and "self" are two very different conceptions, and it is in connection with the fact of permanence that this difference comes out. The subject, as we have seen it, is constantly changing. It is now this thought and now that. It differs from moment to moment as its object differs, and, though its logical position is always similar, what right have we to call it the same in every case? Why, in short, do we say that *I* was the subject of yesterday's feelings and of this moment's mental activity, it being understood that by the term "*I*" precisely this sameness is intended?

The answer to these questions has been thought to be supplied by the same broad facts of knowledge which we have just been considering. I mean, that the permanence of the subject has been taken as proved by the very nature of the

¹ I have spoken for simplicity as though the act of apprehending were first given to memory. There seems no reason to deny that this may be the case, and if so, we must admit that memory may give us, not merely facts given in apprehension, but also the fact that we apprehended them. But a mental act may itself prove the object of attention while it is present. I may think of my tea, and be aware that I am thinking of it while I ought to be intent on my work. It is only a question of the "extent" of consciousness. The thought which clearly comprehends a subject and object is necessarily one degree more complex than that comprehending the object alone.

cognitive act. In most acts of thought there is a degree of complexity in the content. Different elements *a* and *b* are held together in the act, and it is by holding them together that we know their relation.¹ And it does not matter how widely these elements are separated in time or space or character. The range of thought is limited only by the "bound which clips the world with darkness round." My thought accordingly acts as a bond of connection between most distant realities. It is in this sense a "synthetic unity," seeing that it "puts different facts together into one" content for consciousness. But this is one thing. It is quite another to say that the various acts of thought are acts of the same self. Each single thought is a subject for its own object, and for the elements of that object it acts as a bond of union if we like to call it such. But this does not of itself prove that different thoughts, different subjective acts, are also themselves united. Each thought (if you like) "unites" or "holds together" the element of content with which it is concerned. But what holds together the different thoughts concerned with distinct contents? This is a further question to which we have now to address ourselves, but it is not to be determined by the mere analysis of the cognitive act itself. In short, the synthesis of different elements in one thought must not be compared with the permanence of one subject in many thoughts as one continuous reality. Yet this confusion is made when the "synthetic unity" of consciousness is made a sufficient ground for the unity of the soul in all its experiences.²

Just as the subject is not as such the permanent self, but is any "passing thought" of that self, so the self is not as such subject. That is to say, though it is continually acting as subject in this or that intellectual activity, it is also as constantly object—and object to other thoughts, other phases of itself. The self in different times or in different relations is indeed now subject and now object, and in them the two ideas come together without contradiction. And by becoming object the self does not cease to be self. That very act of it which appears now as subject figures next moment as object. Granting a single self in all acts of thought, this

¹ I am not able, for reasons before given, to go the whole length and say that it is by this process that we know *them*; but I need not raise this question here. I will take acts involving relation as typical of the thought process, and discuss the question on that ground.

² I need not further labour a point which has been so well made by Professor Seth (*Hegelianism and Personality*, chap. 2, etc.) and Professor James (*Principles of Psychology*, vol. i. chap. x.).

possibility follows from those very facts by which we know of the existence of a subject in the first place.

2. Our notions, then, of the "self" having to be derived from experience, i.e. the analysis of observed facts and their postulates, and there being no initial logical difficulty in the way of such analysis, the conception of the self becomes at least a possibility. It remains to ask what light experience throws on it as an actuality. In what way does the self appear to us when we analyse our experience?

(i.) As with objects of sight and touch, so with feelings; apprehension gives us not only individual facts but totalities. I am able to observe my own consciousness. How or why I have that power may be inexplicable, but the fact remains that I do so, and from that fact we start. This observation reveals to me, not single perceptions, thoughts, or feelings only, but a union, sometimes a complex union, of such states of consciousness. That which is feeling hungry is also attending to certain written words, and at the same time has its attention distracted by the crowing of a neighbouring cock. All this—though the use of general terms involves strictly the formation of qualitative judgments—is, as the subject of such judgment, matter of immediate observation, just as is the union of attributes in the material thing. The form of union, however, is not wholly the same. In the case of contents of vision, touch, etc., the point of unity is occupancy of one portion of space at one moment. In the present case the contents considered occupy the same moment and vaguely the same space—that is to say, they are referred in every case to some portion or other of the body, and in many cases to the head. But even in the last case the local reference is too vague to be considered as constituting an apprehended unity in the strictness required for our purpose; it is rather the fact of consciousness itself which is given to our self-observation as a single fact. A single consciousness of a variety of objects is the best general characterisation of the particular totality under consideration.

(ii.) If we apprehend unity of consciousness in individual moments, we are also directly aware of its continuity through spaces of time.¹ This knowledge is the fruit of a construction of memory and of the present, but may be as clear as any other memory synthesis. Thus I have a very vivid remembrance of the stream of my own consciousness in the pain or pleasure that I have just passed through, in the train of thought that I have just brought to a close, or even in the

¹ Cf. on what follows James, vol. i. chap. x. esp. pp. 334-336.

sequence of perceptions to which I have been attending. That the unity so "constructed" is truly the unity of my consciousness is definitely proved by the case where there are breaches in the continuity of the contents of that consciousness regarded in abstraction from myself as attending to them. When sound and pause, or feeling and thought, are interwoven, it is only the thread of continuous attention collected in memory as having run through all that gives them for me any unity. The permanence of consciousness through certain periods of time, therefore, is matter of memory and construction.

(iii.) The life of consciousness is broken normally by sleep and abnormally by various other forms of unconsciousness, so that continuity of consciousness through life as a whole cannot be directly given to our observation. What, then, does memory mean by its asseveration that a fact of yesterday was a state of my feeling, a thought of my intelligence? This judgment is clear enough as long as the "me" is a definite given continuous whole which, like any other whole, has states and conditions, temporary or permanent, which stand to it in the relation expressed in language in terms of possession. Clearly, the memory-judgment extends this continuity and possession beyond the intervals of unconsciousness as far back as its own powers reach. That is to say, I treat the consciousness of yesterday as forming somehow one continuous whole with the consciousness of to-day. On what ground do I do this? In what way do these different streams of consciousness form one intelligible whole?

First, all my conscious life has, after all, an element of continuity. It is true that *consciousness* itself is discontinuous. But the interval of sleep is not such as to break up the continuous serial order in which the facts of waking life are arranged in my memory. Sleep, or at least dreamless sleep, is in a way a mere blank, but it is a blank which memory finds interpolated between two elements of the conscious series parting them by a more or less definite interval, but preserving them in a fixed temporal order. The last waking thought before I went to sleep and the first glimpse of sunlight this morning are for my memory related in time, separated by an interval which seems to me of some length. That our measure of the time we have slept is very inaccurate I am quite aware. With some persons, or on some occasions, it is more accurate than with other persons or on other occasions. But most people, I take it, when they awake, have, if they think of it, a certain "feeling of the time" that they have been asleep—a sense

of the duration that has elapsed. Now, with the degree of accuracy of this measurement we are not concerned. Our point is, that if we are to give a correct account of the memory continuum we must think of it as an ordered series of facts—a temporal continuum in which successive series of conscious activities alternate with intervals of unconsciousness. This total history of consciousness is the self as memory gives it me. When I say that I did such and such a thing, I mean that the activity in question finds a place in that series. This series of facts is the "me," and it is the same, in the sense, at least, of being continuous with, the "I" which now thinks.

But have we not proved too much? Surely in this series every fact that has entered into my knowledge is contained. All that I know or have heard of, from the motions of binary stars to the bacon I had for breakfast, from palæolithic man to the advent of social democracy, all surely is included in this vast vague series of my experiences. Now, it is true that my consciousness has in a way to do with all these things, but in what way? Aristotle's $\eta \psi\upsilon\chi\eta \tau\acute{\alpha} \epsilon\nu\alpha \tau\acute{\omega}\varsigma \iota\epsilon\rho\iota \tau\acute{\alpha}\nu\tau\alpha$ is unobjectionable if we are allowed to define the little word $\tau\acute{\omega}\varsigma$ just as we like. But, in truth, any given element of the external world is a fact of our experience only in the sense that it was once present to our consciousness, that our consciousness was once aware of it. Our experience is an ambiguous expression. On the one hand, it means all that has been within the scope of our apprehension; if we extend this by inference, all that has been within the scope of our thought. It is then potentially $\tau\acute{\alpha} \tau\acute{\alpha}\nu\tau\alpha$. But in another sense it means the series of our own apprehensions, thoughts, etc., regarded as states of our consciousness. It is true, as we saw in our last chapter, that these states are qualified, and qualified in accordance with the facts with which they deal. The series of conscious activities is not a row of conscious states in the abstract, but of definitely qualified acts, each with a filling of its own. This filling, however, is not its object but its content. Not palæolithic man, but any thoughts I may have had about him, enter into my memory series as my *self*. I remember the battle of Waterloo and its date—I remember in the sense that having once learned I can always assert as an objective fact that it was fought on June 18th, 1815. I remember, perhaps, having learned this as an experience of my conscious self in childhood. Thus the external realities with which from time to time I have been in contact are remembered, but, for reasons explained, are referred to a substantial reality other than the series of consciousness.

The conscious series, then, not the whole mass of facts with which that series has had to deal, is the whole which forms my self. But this series, we have seen, contains intervals of unconsciousness, and hence we cannot take the fact of a persistent, conscious activity, as equivalent to the self. Not conscious activity, but the history of consciousness as remembered, its persistence in states of all kinds, its lapses and its reappearance, form the primary self of memory. But if we allow that consciousness is ever non-existent, is it not many consciousnesses rather than one which our memory reviews? If we adopted that form of words we should still say that all those consciousnesses together form myself. There is no consciousness other than my own given in memory. By self I mean the totality of consciousness with its lapses—all the consciousness and all the unconsciousness—that I can remember. This is the history which *prima facie* forms the self.

But this, it may be objected, is a merely verbal answer. The underlying question is not whether the self is a name for a certain total stream of fact, but whether this whole is in any real sense a unity. And here our dilemma seems serious. On the one hand, the only constant intelligible feature to which we are able to point as giving meaning to our term "self" is the fact of consciousness. On the other hand, this fact cannot be regarded as persisting unchanged. It changes in the vital and complete way of totally disappearing at intervals. If, then, consciousness is not continuous, but recurrent, there will be many consciousnesses within our memory series; and if consciousness = self, there will be many selves. It is useless to retort that there is a *qualitative* identity in the different manifestations of consciousness. This is merely to cover up a difficulty under a fallacy. Qualitative identity means complete resemblance; and points of complete resemblance there doubtless are through all phases of the conscious life. But resemblance is found in many distinct, individual things, and is no sufficient criterion of individual sameness. When we think of the self as one we do not think of it as a number of quite similar consciousnesses. We think of it as one persistent individual; and the question now is, whether we are entitled so to think of it. It will appear at once that since consciousness is not as such continuous, we can only be warranted in thinking of it as really one, if we have ground for taking it as an element in a single persistent whole. There must be other conditions really permanent to make up this whole. If there is such a whole in which consciousness is a part, there is one true self; and in thinking of myself as an unity I postulate

such a whole. We have now to consider on what this postulate rests.¹

(iv.) So far we have exhibited the self as what we may call a *de facto* temporal continuum in which there is no single sensible fact permanent throughout, but a rhythmic recurrence

¹ In the above account I am the victim of a double disagreement with Mr. Bradley, from whose account of the self I have learned much. First, I cannot agree with him there is no definite and intelligible fact, or set of facts, referred to by the term. The self, it will be seen from my account, is to me the subject, together with all that I attribute to the subject (such as feelings, and all the conditions (to be considered in the next section) forming that persistent whole of which my consciousness is an element. Now, Mr. Bradley, in his searching discussion of the claim of the subject to stand for the self (*Appearance and Reality*, pp. 88 ff.), denies the possibility of finding any single element that can consistently be called the subject, on the ground (if I understand him rightly) that anything you like in the field of consciousness may in its turn become object, and, "in that sense, a not-self." At anyrate, the residue which does not become object is inconceivable. But this does not seem to be the question. Certainly, anything in consciousness may become object, and for my own part I do not see how we could know anything about it or say that it was there unless it became object. But then, "object" and "not-self" are two very different conceptions. There seems here to be the confusion on which we touched above. It comes about in this way. Every subject is an activity, a thought of a self. And every object is distinct from and contrasted with its own subject. Hence object and subject become contrasted as such, and, subject being identified with self, object is contrasted with self. But, in fact, a subject (this act of thought) may also be an object only in *another relation*, i.e. to another act of thought. The contrast is not between object and subject in general, but between the object of this subject and the subject of this object. Hence, that any element alleged to belong to the self should become object to some further thought is no argument against its belonging to self. Further, the identification between self and subject is not complete. The subject is always an act of self, but the self is not always a subjective act. It is subject *plus* whatever concrete character attaches to the subjective act plus whatever objects are referred to the same totality as these acts as against other totalities.

What I call broadly "consciousness," then, seems to me the constant and determining characteristic of myself. But when I ask why this consciousness is "one," my second point of difference from Mr. Bradley emerges. He treats the question of continuity (*op. cit.* chap. xxiii, p. 313 ff.) as "quite unimportant." "Even apart from memory, if these divided existences showed the same quality, we should call them the same." Perhaps we should. But if that was our only ground we should mean something quite different by the word "same" from that which we really do mean. We think of ourselves as continuous unities, not as multitudes resembling one another. And anybody who can draw this elementary distinction must admit that, since consciousness as such does not prevent this continuity, our conception, if justified, must rest on some further reality which is continuous and in which consciousness is contained as an element in a whole.

The notion that continuity is unessential to the self is parallel to the idea of an identity as between all selves. This identity may mean one of three things: (1) a partial resemblance, — this no one doubts; (2) that all "persons" belong to the one whole of reality and are so far interdependent, — this again is obvious; (3) that you and I are one just as I am one. And this is a sheer confusion between two senses of identity. You might as well say that two peas were one, or that two copies of a book were the same in the same sense as that in which this copy I hold in my hand is the same one which I bought in Oxford last year.

of consciousness and its absence persists from beginning to end. We come now to further characteristics of this whole. Not only does memory give us a certain continuity with a certain permanence of character, but the very existence of memory and the further activities of construction and inferences which depend thereon postulate a direct causal connection between different stages of this series, that is, between its states at different times.

The memory-judgment is an assertion framed now about a content which was given then. If memories arose with no basis in past fact the memory-judgment would be false. When we rely on the truth of our judgment now framed about the past, we imply tacitly that unless the past had been the present judgment could not be. Without this postulate the remembrance would indeed remain as an assertion, which I am now forced by psychological or other laws to make, but which cannot be trusted as of any logical value. It is a mere mode of my present consciousness, and its reference to the past is as valueless as that of the victim of hallucination to the outer world. We do not in general go through any such process of reasoning with regard to our memory; the memory-judgment has a force of its own which carries belief. Like all mental processes it is originally spontaneous and unreflecting. But what really makes it true must be a direct causal connection, and this is in practice acknowledged when we are led by observing the workings of memory to distinguish the conditions under which, the person in whom, or the ages when, memory is relatively weak or strong.

But causal connection, as we have seen, involves continuity of existence. The real cause of a result is that which becomes that result. That which apprehends then must become that which remembers. There is the continuity of necessary sequence in time to connect them. Thus, briefly to sum up the position, we have now two features of the self—on the one hand, the remembered series of the life of consciousness, with its appearance and disappearance in rhythmical order, and with all the variety of its concrete filling; on the other hand, the tie of connection between the temporally distinct stages in this life, indicating that the one becomes the other in the fullest sense. And experience of the interdependence of feelings and actions of every sort enters in to this second conception to define and amplify it.

3. Now, how far do these data take us towards the conception of the self as substance? This will depend on two points—(a) how far we can regard the self as a true self-determining

whole, and (b) how far there is an element of qualitative likeness persisting through its history.

It may be objected at the outset that a term like substance applied to the mind is misleading. Substance, the crudest objector will remark, is a term applied properly to material contents, and in transferring it to the mind you are reviving the primitive theory of the ghost or double, the thin vapoury substance supposed to permeate the animal frame, and perhaps to issue with the breath, if indeed the breath and soul be not identical. This, however, is a purely verbal objection. By substance we simply mean any form of existence which can perpetuate itself without the aid of anything else. We have, and should have, no prejudice as to the apprehensible nature of any content which can perform this feat. But another difficulty remains. No substance can propagate itself except continuously, and as we have seen, and as Locke showed long ago, "We think not always." These activities and states whose mutual relations build up for us the idea of self, being from time to time suspended, cannot be the whole which determines itself; they must be elements in and modifications of some wider whole.

Here two alternative suggestions arise. This wider whole is the body. This wider whole is the true ego which is in reality distinct from all its states and activities. Now, first, let us bar certain claims which either of these theories may make. Granted that our known mental states are not the whole that is self-determining, you have no right on that account to exclude them from the whole altogether. Because they are not the whole, it does not follow that they are not parts. This conclusion is drawn by those who hold either the body or an unobservable ego to be the true self. By both parties, that which really makes us believe in a self, the tie observable in and implied by our mental states, is excluded from the self, and a second tie is set up outside our conscious states to bind them together. This is the result of any theory which makes either the ego (understood as something distinct from the series of conscious states), or the body, the true *subject* of thought or feeling. The subject we have always seen to be a state of consciousness, capable in its turn of becoming object for our observation and our memory. Any further subject standing behind this subject, and owning it, is simply a superfluous assumption. Similarly, the notion that the body can be subject is simply a confusion of the kind which takes an undulatory movement to be red or blue. We know what the subject is by observation and memory. It is an act of consciousness. It is *not* a disturbance of equilibrium in a pyramidal cell, or any number of cells. It may be con-

nected with such disturbance, and that connection may be a very important fact. But the scientific treatment of the relation is put out of court from the outset if we begin by saying that one of the related terms *is* the other. This simple "is" would merely abolish the relation, and for two terms substitute one. But if we reject this reasoning, we must at the same time admit that the tie between the facts of consciousness, as we know them, is incomplete. We have not the totality of conditions in the manifestations of psychic activities regarded alone. Restating the question, then, we have to find the residual conditions of mental life, and for these either the body or the ego may stand for the moment as expressions.

4. Meanwhile it will be useful to look at the matter from another side. Taking the self as a continuous series partially self-determining, we may ask whether there is in this series any persistent qualitative character of the kind which leads us to attribute substantial identity. We shall not for this purpose require the unbroken presence of any assignable sense attribute. We shall expect to find changes, just as we find them in the history of any self-determining continuum interacting with other facts. But is there in the soul any element which persists unaltered through change—any element present in every conscious state, or any characteristic of the relation of different states of consciousness? At first sight there is difference everywhere; the sensations of no two moments are alike. Looking again, there seems much sameness under this diversity—certain broad features of the mental life, the fundamental activities of, *e.g.*, perception, inference, feeling, willing, remain unchanged, although that which is perceived, inferred, felt, or willed may vary without limit. Again, the very changes introduced into the self are permanent. The mere fact that apprehension must precede memory or idea is an instance of a modification persisting in its results. Again, other changes occur of the nature of development,—the character grows; but such developmental growth is quite consistent with a continued identity. At most, it would indicate that in some respects the self is a self-determining process as well as a self-determining identity.

But now, considering the matter still further, these points of likeness between different phases do not seem to be strictly continuous. The breaks of psychical activity again come in to mar our conclusions. What is strictly permanent is not the fact of wishing or thinking, not even the broad fact of consciousness, but the rhythm of consciousness and unconsciousness, and within the former the reaction of consciousness in

this or that mode to this or that stimulus. Putting the result thus, the self would be a process containing constantly recurring points of resemblance. It would not be mere process, i.e. continuous change. We might even from a certain point of view call it a persistent identity. For just as two undulations of one wave resemble one another, if you take them as wholes, while from part to part they differ, so a whole phase of the self—a complete pulse of the psychic life, including sleeping and waking hours—repeats itself in the broad features mentioned over and over again. So far, then, the self appears as a stream of fact presenting constantly recurring points of qualitative likeness, causally interconnected throughout, and capable at any point of viewing itself as a whole. But the qualitative likeness is not unbrokenly continuous, nor is the causal connection complete and unconditional. The search, then, for the true self which will make good these two deficiencies, and so constitute what we may call the soul, is a search for elements into which the facts of consciousness may be understood to enter as factors, and which with them make up a "self-determining," and therefore truly continuous, whole. Such a whole might maintain its identity unconditionally, or only by the aid of certain external circumstances. In the first case, the totality formed would persist eternally; in the second, it would be strictly continuous through our remembered experiences, but not necessarily beyond. What we want in any case is a body of persistent conditions forming a whole, in which the facts of consciousness can be intelligibly included as determined and determining members.

5. Returning to our old suggestion for these conditions, the ego strikes us at once as little more than a phrase. It stands as an expression of the felt intellectual need for some permanent condition of soul life, a "regulative principle" or hypothesis on which we work;¹ but any attempt to understand or define it ends only in stripping it more and more bare of all content and interest. Immortality, as a ghastly monad or "bloodless category," would not be worth having—not even worth controverting.

What the ego loses the body seems to gain. The body is a reality; we know what we mean by it; and it is in our experience permanent. Here, then, it seems we get all that we want—a set of conditions strictly permanent as long as our experi-

¹ This is its real position in the *Kritik of Pure Reason*. The soul of "Rational Psychology" is an idea of the reason,—not an object, but the "action of a regulative principle." See *Transcendental Dialectic* (2nd ed.), bk. II, pp. 235, 234 (Mackiejohn's trans.), and Appendix, p. 417.

ence lasts, and more than this we cannot properly require. In the facts of body together with the facts of consciousness we have a true substance, conditionally self-subsistent.

The positive side of this result we may clearly accept without reserve. In the conscious physical organism we have an empirical substance of the kind described in our last chapter, which *quâ* substance is much in the position of the ordinary "things" of the outer world, but is distinguished from them in its content and behaviour. The self, I should put it, is at least a substance, so far as the living organism is so: in that substance at least we find a home for consciousness or feeling. The question is, whether this is the ultimate account of the matter. Is the totality, in which body on the one side and consciousness on the other are the apparent elements, really composed of those elements alone, or are there in it further conditions? Again, are these known elements strictly interdependent, or are there, again, further conditions maintaining each of them and the observable relation between them? In a word, we have before us the relation of mind and body.

This question, we must say at once, is not strictly one for logic or metaphysics. The result of the debate must interest us and form a valuable datum for our investigations, but the debate itself must for the most part be carried on by the psychologist and the physiologist. All that our theory can do in the matter is to point out one or two general considerations to guide us in the uncertainty which must at present hang about the whole matter.

The case stands briefly thus. It is in part known and in part supposed on good ground that a molecular process of some kind accompanies every act of consciousness. Of this process itself very little is known, though we have some data for determining its speed, and we know that the propagation of its effects along a nerve is accompanied by changes in the electric state of the tissue affected. In man there is considerable reason to suppose that only such changes as take place in the cortex of the hemispheres are accompanied by consciousness. In the case of the lower animals this is far from certain. Within the cortex certain areas appear to be specially connected with definite psychical functions; for example, the occipital regions with sight, the temporal with speech and hearing. But there is no evidence that these areas act independently of the rest of the brain. Nor is there the slightest indication of the point of the molecular process at which the corresponding mental change begins.

Our actual knowledge, then, of the connection of mind and

body reduces itself to a probable concomitance, corresponding detail for detail, of mental and physical changes. If we start from either side of this process the question of how the other side comes about is entirely unanswerable. There is nothing to show what sort of molecular process brings consciousness into existence, nor why it does so. It is impossible even to say what processes are accompanied by consciousness and what are not. If we take purposive action as our test, we must allow consciousness to the spinal cord of a headless frog. If we reject it, it seems impossible to draw the line at any point between the headless frog and Isaac Newton. Again, the consciousness of somnambulists, of the hypnotic trance, of "split off" selves, etc., presents the greatest possible obstacles to any assumption as to the relation between physical and mental changes. The relation, then, of the physical and the mental is *one of probably constant concomitance, not one in which the causal connection is as yet fully analysed and understood.*¹

If, again, the object were to prove the independence of the "soul" as the true vehicle of consciousness, the first requirement would be that conditions other than physical states of the brain should be assigned which remain strictly continuous through experience. This done,² to prove the soul's independence of the body, we should have to go about just as we do in our attempt to show any complete causal connection, and here we need not dwell on the inadequacy of any arguments that could at present be urged. We could only remark, that even if the soul were proved a true self-determining whole into which no bodily elements entered as positive conditions, it would not (in accordance with the conclusions of our last chapter) follow that it is

¹ I am not pretending to discuss the subject at second hand, but am merely referring the reader to some of the well-known points of difficulty given in full in any psychological text-book, see, for instance, the opening chapters of Professor James' *Psychology*.

² The question of unconscious mental activity becomes important in this connection, as affording a possible alternative hypothesis to the body as the permanent element in the self. I do not wish to prejudge this question, but I wish to advert to a distinction too often ignored between "content" and "activity." (a) Every content of a mental state must surely exist for a conscious state. And thus the expression, an unconscious or subconscious feeling or idea seems almost a contradiction in terms. A feeling that is not felt seems to me much like a blow that is not struck, or General Wade's roads before they were made. On the other hand, *no* a mental act is always *as such* unconscious. When I judge or infer, I am not necessarily conscious that I judge or infer. If I am conscious, moreover, that involves, as we saw above, a second act of intelligence, for which the first is now object. Any given mental activity, then, is conscious, not of itself but of its own object. There is no difficulty at all in the mind's acting without being conscious that it is acting. The question really is, Can there be any mental act which is not a consciousness or assertion of something? And this question we may at present leave open.

unconditionally persistent. Certain modifications of the external order might act upon it in such a way as to modify or finally to destroy it—that is, merge, or shall we say submerge, its individual life in the greater stream of existence.

Failing any positive conclusion on either side, we may say this much. What we call the body is a certain coherent mass of attributes. No one, I suppose, imagines that the attributes we know exhaust its whole nature. We do not suppose this in the case of a piece of iron or stone. The true stone includes the properties known to us, and much more. To the universe the stone is much more than it is to us. We know it only from certain aspects. So with our own bodies, only that here the aspects are more varied. We know them as ponderable, extended, and so on. We know them also as feeling or thinking. These two sides seem leagues apart, and the inference is that the total character of that in which they are elements is very much richer than anything of which we know. Body, then, as such is not soul; nor, again, does body "act on" soul, nor soul on body, as two separate "things" on one another, but their changes are interwoven as connected phases in the complex constitution of the greater whole of which both are elements.¹ And this whole is the real self.

¹ We might help ourselves to conceive the relation by thinking again of the combination of properties in the material things already referred to. A body emits a red light "because" its molecules are vibrating 500 billion times a second. Physicists have become accustomed to "explain" this by treating the vibrating molecules as the "real," i.e. external body, and the red light as a "mere" sensation. But going back from this hypothesis to the facts as we first find, or are led to believe, them, we have the whole reality, the luminous body, with two very different characteristics: it is shining with a red light, and it consists of particles in vibration. And these two fundamentally different elements of its content are inextricably bound up together. You could not say that one acted on the other, for there is no before and after. As the vibration begins, so the colour comes into existence; as the rate of vibration rises, so the colour changes to orange, yellow, etc.; as the amplitude of vibration alters, so does the intensity of the light. You may say that the one "is" the other, but this solves nothing, for if you come to analyse your "is" you will find that it is a mere expression for some such a relation as that already described. In short, taking the results of the theory of colour, or heat, or sound just as you find them, they lead you to the belief that in a concrete thing these of its characteristics which we call its molecular condition on the one side, and its colour, etc., on the other, are universally connected. And this is a connection holding within what appears to be one substance; it is a connection of one attribute with another.

Now, the relation of mind and body seems just parallel. A molecular change in some portion of the brain is accompanied by a sensation or an act of thought, just as the molecular change in a gas when it is lit will render it luminous. The concrete reality which in the self presents, again, those characteristics which we call the facts of consciousness on the one side and those which we call molecular change on the other. And once again the relation between the

6. We may put together the results which we may be fairly said to know with the problem which directly arises out of them, somewhat as follows. The material facts which we call the body on the one side, and the facts of consciousness on the other, along with further at present undefinable elements which we are bound to infer, form together a "substantial" reality of the empirical order. That is to say, the whole which they form is self-subsistent on condition of the maintenance of certain general characteristics of the environment. But it subsists, not merely as identical, but also as changing, and the ultimate phase of its changes involves its own dissolution—death. To this substance, then, the self is referable, if to no other. And so much seems to result directly from experience. But this substance,—body and soul, or animated body,—being composite or many-sided in character, the problem arises whether certain of its elements can "maintain themselves" apart from the remainder. If so, and if the existence of consciousness is bound up with these elements alone, its persistence would not depend on the body. If not, body and soul are strictly attributes of a single substance, which as that substance disappears at death. If we assume the material atoms of the body to be true substances in the ultimate sense of our last chapter, we should in the former case have two substantial elements—the material and the physical coalescing

two is that of the connection of widely distinct attributes within a concrete whole. The "explanation" of such a connection is to be found, if at all, in the residual character of the whole at present unknown to us.

Of course, this or any other hypothesis labours, in the case of mind and body, under the added difficulties which come from the very slender knowledge which we really possess of the facts of the correlation of brain and consciousness. We do not (as has been pointed out in the text) know the character of the molecular process involved, nor do we know what part of the nervous system it must affect. We ordinarily speak easily of the "brain" as the organ of mind, but this is mere figure of speech. We cannot go into the evidence here, but the tendency of research would seem to show that there is no one definite part of the nervous system which must be affected in order to produce consciousness or any given mode of consciousness; but that the "effect" which any given process will have "on" consciousness depends, not only on what that process is, and through what area it goes, but just as much on how other areas are situated, and what they are doing. At any rate, until the facts of inhibition on the one hand, and substitution on the other, are better understood, we shall have no certain knowledge of localisation. We may be able to localise, but when we have done it we do not know what it means. It is, in any case, premature to speak with Wundt of a general apperception centre, and impossible to think with Volkmann (*Lehrbuch der Psychologie*, §§ 12-16) of the soul as occupying a central point of the brain-tissue at which all cerebral excitations meet.

On the whole subject cf. Bradley, *Appearance and Reality*, bk. II, chap. xxiii.; James, *Principles*, vol. I, chaps. II., III., V., VI., and Höffding, *Outlines of Psychology* (Eng. trans.), chap. II. The identity theory of the last named is stated with admirable clearness, but is perhaps, as it stands, a degree too simple.

in the whole which we know as the living person;¹ in the latter case we should have a single ultimate substance, or aggregate of substances, which in certain of its phases becomes a living person. From neither point of view does the relation of soul and body become more intelligible. We cease to know and we cease to understand when we try to go behind our whole of many-sided, interwoven features.

Lastly, if we put specific experience altogether aside, and are guided only by the general considerations of our last chapter, we are bound to postulate *some* ultimately self-maintaining reality as the "substance" to which the facts of consciousness are referable. If this is what the self means, its existence must be postulated as a matter of necessity. Only, there is nothing to show that such a "self-maintaining" system could be found anywhere short of the *omnitude realitatis* itself. The individuality of the self could not be proved after this easy fashion. The substance so postulated must therefore be held distinct from the conception of the self as matured by experience.

7. Turning back, then, to experience, and asking of it our original question, What is the self? we have, again, two possible answers, the first of which leads on to the second. *Prima facie* the self is all that my consciousness is and has been, including its lapses into unconsciousness. In this series, when memory reviews it, I find my me. But this me has features which lead to a further answer. Its phases appear to be causally connected in a way which suggests that they are changing states of a continued identity. And so the self comes to mean the self-maintaining and self-developing whole to which the conscious series belongs. What this self is, and whether its self-maintenance is absolute or conditional, are questions which we can only answer in part. That, whatever

¹ I say two substantial elements, not two substances. The conception contemplated in the text would not reintroduce the two-substance doctrine, that is, it would not suggest that body and soul are like separate "things" in separate spaces, and acting on one another. It still conceives them as attributes of one whole, and attributes which, as that whole stands within our experience, are inextricably interrelated. But it suggests that under condition of some modification in that whole this interrelation might cease, and that both attributes might now persist in a different grouping, and apart from one another. To put it in terms of our former analogy, it is as though the connection of vibratory movement with colour were dependent on a certain condition of the whole material thing, and that this condition being altered, the colour, together with the conditions on which it ultimately depends, could persist apart from the molecular vibrations, and *vice versa*. In other words, the self is still conceived as a whole in which "body" and "consciousness" are elements, but it is suggested that the interrelation of elements forming the whole may be conditional, and if so, some of the elements may persist in a new whole apart from others.

it may be, which maintains and develops itself, and in response to certain stimuli becomes active consciousness, determining, further, both what is permanent or recurrent in that consciousness, and the changes which it will undergo in response to further stimuli, that is the permanent substantive structure of the self. In our experience, body and soul appear as different constitutive elements of this totality. But whether this is the ultimate account of the matter, or whether the structure required may subsist in some way independently, though united in one substantive totality with the body in our experience, is a question which we cannot decide.

The "certainty of our own existence," which we all take as axiomatic, means either (a) our confidence in the stream of consciousness as given by memory, in this case it really amounts to belief in memory in general as against an isolated remembrance; or (b) that this "stream" is an element in a self-determining whole. This belief, again, we have seen to be an intellectual necessity; though whether the "mental structure" is itself that whole, or whether it depends on further conditions such as the body, is a question which we do not here attempt to resolve.¹

¹ The very important question, what constitutes the "same" self, thus has two meanings. The first really is the self of my memory, and accordingly sameness vanishes when memory vanishes—

"Interrupta semel cum sit repetentia postrum."

This is the sense of the self as directly known and of interest to itself. A second meaning will be the self-determining stream of existence, and here the questions will arise, How much self-determination and how much qualitative resemblance must there be to constitute A B the same person at two different periods? The question of responsibility depends on this point. Law and popular morality go by the body. Same body same self. "Another ear" must bear the burden of whatever "self" made use of him. But this, though possibly a working rule, is not the theoretical, nor therefore ultimately the just solution. It is impossible for a single self to be responsible for all that the body does, say, under hypnotic suggestion, or in insanity, or in an "alternating" personality. The question cannot be discussed here, but the development of psychology is likely to make its practical importance more and more apparent.

For most points in the above account of the self I am indebted mainly to Professor James *Principles of Psychology*, vol. 1, chaps. ix. and x. and Mr. Bradley *Appearance and Reality*, bk. 1, chaps. ix. and x. and bk. ii, chaps. xiii. & My point of difference from Mr. Bradley comes really to this, that in my view, in the fact of consciousness and its changes, there is a definite meaning for the conception of self. Consciousness does not cease to be self because it becomes object as well as subject. The self, then, to me is real, though we do not know the whole of its reality. I do not question the reality of the self because I am unable to assign a point of persistent identity within it reconciling its differences. I believe some such identity to be postulated by the facts, but even if it did not exist, if all the soul's being were change, whether cyclical or progressive, I should not on that account take it to be unreal. It would be a real process instead of a real persistent fact, but it would be none the less real.

CHAPTER VI

REALITY AS A SYSTEM

THE "persons" and "things" of experience have, as we have urged, their measure of independence or substantiality. But they are also interdependent and related in their behaviour to one another. The one thing ultimately and completely "substantial" or self-subsistent is reality as a whole, and to the conception of this whole we are led by many converging lines of thought. The question then arises, What conception, if any, can be formed of the whole of things? The purport of such a question in such a work as the present must be taken in a narrower and more limited sense than the actual words would imply. Our knowledge of the universe, inadequate as it is, is to be pieced together from all the fragments of all the sciences, and is not to be determined by logic alone. But logic may and must have something to say upon the form which our ideal of knowledge takes, and on certain broad characteristics of the world which that ideal implies. What indications have the preceding discussions given us on this point? What knowledge and what explanation of the whole is possible? Under what conditions is it possible? And what form would it take?

1. From what has been said, it is clear that an explanation of the fact that the world exists, or has come into existence, is an absurdity if not a contradiction in terms. To explain in this sense we have seen invariably involves reference to something else, and he who goes about so to explain this totality of existence will be much like Locke's poor Indian philosopher, who rested the world upon an elephant and the elephant upon a tortoise. It is strange that it should still require intellectual self-control to avoid looking for the elephant, and even postulating it as an intellectual necessity; but so it will be with minds trained as ours are to look at the part when they first turn the eye of the soul to the universal framework of things. But when we have given up the idea of explanation in its

stricter sense, a resource remains. We saw before that ultimately to explain is to give a fact its total place in the system, and we might now add that the broad difference between explanation and other forms of knowledge is that the former gives each content its total, or at least its essential, determination as against the partial systematisation effected by other modes of thought. Of any completely articulated system viewed from within, and ignoring its relations to any other fact, we may then say that every one of its constituent elements is explained, while of the system itself it is better to say that it is the source of explanation. If, then, we extend our system in idea so as to be coextensive with the universe, this totality will itself neither be explained nor need explanation, but it would itself determine and account for the position or character of any one of its elements. Intellectually, then, the ideal of knowledge must be a completed system of this kind.

Let us think for a moment what such a system would involve. It would mean, first, that all the sequences, whether of permanence or change, were reduced to universal connections; that these connections were further interrelated so that any one would imply the remainder; and lastly, that all would be analysed into elementary sequences in which the antecedent should of itself be understood as a sufficient ground for the consequent, while the combinations of consequences should follow analysed laws of perceptual construction. Secondly, by means of these laws of sequence all the particular facts of existence should be so connected that, starting from any point, we should be able to understand how and why everything else falls into its place. We should still have, we must have, a reality to start from, which we take and must take as given; but in a completed system of this kind we should have the whole of reality so interconnected that the starting-point should be immaterial, and that each atom of reality should reflect the universe. Reality, then, would be explained, not as referred to something else, but as presenting in itself a completed, articulated or intelligible system. Is "explanation" of this sort ultimately possible? It appears to meet with two obstacles.

2. (a) The first of these arises from the conception of infinity—in the ordinary sense of endless space and time—which would seem to put the summation of reality into a true whole altogether out of court. How far these difficulties militate against the very conception of a whole of things we shall discuss lower down. Here we deal with them only as affecting our ideal of a completed knowledge.

An universal science would not be an inventory of existence

in which each thing was known individually. Knowledge works through the universal, and it is the essence of the claim of thought that to know the part is in some degree to know the whole. Each strictly scientific truth is taken to hold universally, that is, to be potentially infinite in its extension. And thus though a finite mind could not number all things and "call them all by their names," it can yet know something of all, even of infinite reality. A reference to an old fiction will illustrate this point. If it were true that all things moved in cycles, that "earth did like a snake renew her winter weeds outworn," and this without end, then to know one cycle would be to know all time, and yet the one cycle could be a finite, and so far a knowable, totality. Short of believing in cycles, we seem bound, if we reason at all, to hold that our results, if good at all, are true of the infinity of things, and that accordingly our understanding of the world-whole is a matter of approximation.

(b) But there is another difficulty.

We have seen that the element of variability must be left a permanent indestructible fact of the universal system, and that it is not to be resolved into the complexities of uniform sequence. Yet to "articulate" our system—if we remember, as seems sometimes forgotten by those who speak much of systems, that "articulation" must rest on some definite principle—we require each element to be determined, and that, again, would seem necessarily to mean that it is connected with other elements by universal laws. How can these positions be reconciled?

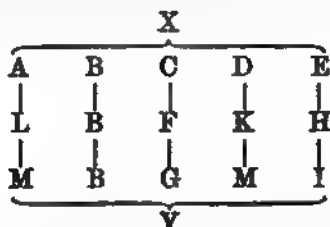
The crux arises when in different parts or areas of reality we have relations

L	K
M	M

and we cannot account for the difference between L and K. Why, given M, is L here and K there? That is the "arbitrary" disconnected element left over by our present nexus of universals. Supposing, however, that L and K were themselves universally in this relation, so that given L you would in some point of time or space, near or remote, but at a definite distance, find K, then we should have a completed chain of universal links if we start from L. Still, we should have to assume L, rather than K as given in *this* area, and that, again, would be arbitrary. This suggests another line of thought.

Let X be some whole constructed of definite elements in definite relations, possessing as a whole a certain determinate character. Then the character of X will determine (and be

determined by) the position as well as the character of its elements. Now L and K may both be elements in, or follow from, elements of X. Thus we may have



in which scheme every part has its determinate position.

The positions of L and K, or of the relations L - M and K - M, are fixed by the function of each in the whole X. And this in accordance with a kind of universal law, only not a law of ordinary inductive sequence, but a constructive generalisation. For the whole X is formed of the elements A B C D E by a law of construction; and similarly, given X the same law determines the position of each of these factors relatively to one another and to the whole. Starting, then, from X, the whole is universal, including the mutual relations of K and L.

Still, K and L may not universally have X as their antecedent. One or other of them may also be a constituent in a whole Y. Then, similar questions will occur about X and Y. We shall want to know the reason of their position, etc. This, again, can only be found if we can assign them as elements to some still wider whole Z. If now in Z we have a "convertible" universal our problem is so far solved. For not only will the Z determine the various relations X - K - M, L - M, Y - K - M, etc., but from any one of these relations we can infer to Z, and hence to the others also. That is, variability is itself "explained," or at least brought into a system of universal relations. Any one point of this system now serves us equally well to start from. Given any single element, all are alike necessary.

Of such a character, then, must the ideal be which, on purely intellectual grounds, we form of the totality of knowledge. Just as the requisites of explanation lead us back to ultimate laws, so the facts of individuality and variation force us to suppose a certain unity of character as belonging to the totality of being which fixes within the whole the place of each several element. The unique and the commonplace, the fantastic and symmetrical, the wildly irregular and the stringently uniform, will all bear their part in determining, and will all be determined by, this comprehensive character. What such a

character may be, it is none of our business here to determine. Whether it be the first cause or final purpose, an immanent spirit or a far-off divine event, a God-like glory or a devilish dream, is no business of logic to decide, but belongs to the concrete synthesis of all knowledge, towards which logic contributes only the dry bones of certain abstract conditions and limitations. It is our part only to insist that some unity of character is the needed keystone of the arch, without which, however much we knit together the uniform, the variable will always confront us, isolated, arbitrary, and unscientific. Any finite whole may be all systematic within and in virtue of its intrinsic character, but its position relatively to others will still and again need explanation. It is only the summed-up whole of the universe, if such summing up could be, which would fix all relations, leaving no point isolated and no collocation variable. And thus, indeed, we feel of the unique as of the commonplace, that it expresses some side of the character of things. The farcical and the tragic, the beautiful and the base, the refinements of design and the blindness of mechanism, are all features of the whole, all go to make up the total character of reality.

The goal of knowledge, then, is a system in which (a) all parts are united to others by universal sequences; (b) the laws of those sequences are themselves so connected by all-embracing uniformity that each necessitates the rest; (c) while the relation of many of these sequences to one another in space or time varies, this variability is determined by the constructive necessities of the whole to which all belong. In this whole, at last, all relations and all facts have their place determined universally by their character.

3. Of the character of the whole which knowledge postulates, logic, we have pleaded, can have little to say. Yet there are certain categories into which it might be conceived as falling, and on those categories logic may claim to say a word. We may conceive the world-whole as mechanical, organic, or teleological in character. Is there, on grounds of mere logic, anything to be said for or against any of these three conceptions?

(a) The category of mechanism need not detain us long. By mechanical explanation we mean two things: the analysis of real wholes into "intelligible" connections—a resolution into elements, and the discovery of the ground of any given whole in some other. In the first sense, we have seen that mechanism has an intelligible ideal. The elements out of which reality is constructed we may conceivably come upon by degrees. Under this aspect mechanism is an essential

element in any view of the world-whole. For, if we conceive the matter (for example) teleologically as an end to be worked out, or even as a life to be sustained, such a result must depend on the working together of elements; and explanation, from this point of view, would consist in assigning the contribution of each element to the assumed purpose. Now, the manner of this contribution must fall within the realm of mechanical explanation. But, in the second sense, mechanism can come to no result at all. It leads at once to the infinite regress, and there is for the spirit of mechanical explanation no rest in heaven or earth. Hence in the endeavour to assign, not the elementary working of causal processes, but the arrangement of the facts which enter in or give rise to these processes, we were driven to a very different conception—that of the whole which by its character determines all its elements, while itself, in turn, determined by them. How do our other categories fare in face of this conception?

(8) Teleology. The subject here is so bewildered by ambiguities of meaning that I must content myself with shortly stating my own view as arising from the principles suggested throughout this work. The conception of teleology, then, as I understand it, is derived from conscious, human action, and it appears to involve at least three elements. First of all, it involves a process in time with some definite result; secondly, it involves an element of value in the result; and thirdly, it implies that this element of value is a determining factor in the process by which it is brought about. Now, that teleological processes exist I have no doubt. An ordinary purposive human act (I should be inclined to say) *may* have a mechanical, but *certainly* has a teleological, character. That is to say, the result A of an act of choice α is an actual factor in determining that act.

We may explain this by referring first to a factor in choice, namely, expectation. A well-grounded belief b in a future event B must be said to count the actual occurrence of that event among its conditions. In a sense, no doubt, the belief arises from certain present or past events, C and D, which have come to our knowledge. But why do C and D give rise to this particular mental state b which consists in an expectation of B? Simply because they are known to be such as to produce B. Take from them this characteristic, i.e. eliminate the coming effect from the conditions, and you no longer get b . That is to say, the expected effect must rank among the conditions determining the expectation. Doubtless the expectation would not arise except as the result of past experience, from

which we derive our knowledge about C and D. But, equally, if nature were not uniform, i.e. if C and D were not really such as to produce B, the belief *b* would not arise upon any logical method. Very possibly, again, we may be able in the advance of knowledge to trace out the causes, psychological or physiological, of belief, and show how the stimuli arising from C and D excite contiguous brain areas or associated molecular disturbances, which in their turn are necessarily accompanied by the belief in question. But the completion of the mechanical chain of causal connections would not interfere with the point for which I am at present contending. The fact that B will happen is a condition without which, under the circumstances supposed (namely, of a mind acting on logical, i.e. sufficient grounds), the belief *b* could not occur. In this sense, then, and in these circumstances, the future must be regarded as determining the present. That is to say, past and future form a whole in which you could argue from one point to another in either direction, whether backwards in time or forwards in time.

Now, just as expectation is determined by what is actually coming, so choice is determined by its result, which we now call its end or purpose. And here there is a direct reciprocal relation. For while in the previous case B would come about independently of *b*, so that the event expected is a condition of the expectation, but the expectation is not a condition of the event expected,¹ here the end is a condition of the choice *a*, and the choice a condition of the end. One difficulty must be noticed. I may choose, not A, but the course of action which leads to A. Then A is really my end, but A may never come about; and if so, since it never comes into being, it cannot be spoken of as determining my action. The real condition, however, is here not the remoter end, but the immediate result of the act of choice, whether that be merely a movement of my limbs or organs of speech, or even a change in my mental disposition. This first link in the chain, which is directly in my power, together with the knowledge of its connection with the real end, is the condition of the act of choice.

The mind, then, is determined in its action by the future as well as by the past, and at first sight we might be inclined to set this down as the differentia of intelligent or conscious action in distinction from the blind mechanism of the material world, which is only pushed *a tergo*. But a little reflection will show that this distinction does not hold, since we shall be compelled

¹ I speak, of course, of ordinary cases. Notoriously, there are instances in which the prophecy is the cause of its own fulfillment.

on our principles to conceive all reality as equally determining and determined in either temporal direction. For, admitting the plurality of causes so far as any partial effect is concerned, there seems every reason to hold that for the true total effect there is but one possible total cause, so that we can infer either way, and the relation is reciprocal. But if this is so, we must in every case, if we extend our view to the totality of interrelated sequences, regard the result as conditioning the cause every bit as much as conditioned by it. We may put it simply and shortly in this way—if reality were such as to exclude the effect, or any portion of it, then it could not tolerate the cause; since it admits the effect, it must admit the cause also.

The true distinction, then, between causation in the mental and causation in the physical world is not that the future comes in as a determining condition, but that the *element of value* appears as a consideration. It is not A strictly which conditions my choice *a*, but V the element of value in A; or if the true determinant of choice be restricted to *a*, the stage in the process to A which is strictly within my power, then it is V₁ the acquired value which *a* derives from its relation to A which really moves me. Purposeful choice, then, is determination by value of some kind or other. And just as one line of explanation for one side of reality leads to the mechanical ideal, as above described, so a quite different line of thought leads to explanation by motives, i.e. by values, and all thought which has human, or more broadly, intelligent, action for its field expects to find its ultimate satisfaction in explanation on those lines. It looks for a standard of value to explain why things become chosen, and so form, as it were, the elementary force by elaborating which, in combination with the manifold complexities of life, we could understand the mass of intelligent actions. On the side of analysis into elementary sequences, teleology thus forms a proper complement to mechanism.¹

To pass now to the world-whole, does the conception of teleology help us? The conception, in our view, implies a process towards an end, an element of value in the end, and the determination of the process by that value. This much assumed, certain forms of teleological conception may be put aside at once. That existence is a realised idea, a comprehensive plan,

¹ I do not here inquire either what form teleological explanation would take (i.e. *what* the determinants of value are), nor whether mechanism and teleology are exhaustive of the forms of explanation. I need only remind the reader that the mass of organic adaptations culminating in the higher reflexes, and passing from them by obscure gradations into the domain of the semi-intelligent, present a *prima facie* intermediate kingdom of great interest and wide extent.

or even a purpose unfolding itself throughout the ages, seem to be expressions without meaning, if intended to characterise reality as a whole. By a plan, for example, we understand a more or less complex set of adjustments planned by somebody for the sake of some end. The somebody and the end fall outside the plan, and a plan which is not devised by anybody nor for any reason seems to be about as real and interesting as a speech which is not delivered for a cause which does not exist. A purpose, an end, cannot characterise reality *as a whole*. There may be something or some one striving towards an end, but if so, the end must be but one element in reality, and not its final omnipresent essence.

In a more consistent form the conception of teleology would fall back upon the view that there is an end for the sake of which the world exists, being shaped by an intelligent mind, or, more generally, being the result of the efforts of intelligence to reach its goal. Here there is a *bond fide* plan—a process and a result and a relation between the two, and with the merits of this conception logic has nothing to do. I merely point out that it is not a purely teleological explanation of things. For it postulates not only a design, but a designer, and not only a designer, but a certain definite process by which the end is reached, i.e. a certain definite relation of means and ends. Now, that these means are requisite to this end, or that these means are used and no others, must depend on, or express, attributes of reality other than the character or value of the end itself—attributes limiting both the mind postulated and its end. Similarly, to postulate a mind at all is to postulate more than the plan which the mind forms. In both these ways the true complete characterisation of the whole is bound to fall outside the province of teleology.

In fact, we may say briefly that the simple consideration of means and ends is itself fatal to the claims of teleology. For an end seems to involve effort and want, and again means by which effort can satisfy itself; and so, on the one hand, the very conception of an end seems to imply something that falls outside the end itself and strives after it; while, on the other, the process by which the end is realised seems fixed by some definite constitution of reality in which the nature of the end itself is only one factor among others. Teleology, in short, is as one-sided and relative a category as mechanism. Both alike are explanations by reference to something else, and are therefore *ipso facto* incapable of standing as expressions of the full nature of the whole.

(7) Of the three conceptions before us, that of an organism

is the least unfit to express the notion of the whole which we have been led to form. A living organism is a whole standing in a relation of reciprocal determination to the parts of which it consists. Each organ of the human body, and each cell of each organ, depends for its peculiar character on the nature of the whole, while the whole is equally characterised and conditioned by the organs which compose it. I do not mean that the lungs came into existence for the sake of respiration, or that the vaso-motor nerves are animated by a desire to regulate the bodily temperature. I mean that, taking the development of the body at any stage you please, and looking at it all round, you find that while you can mentally (or physically) divide it up into a number of parts, no one of these parts could arise or maintain itself without the rest. And the more completely the organism is a true unity the more thorough is the interdependence. There is an obvious development in the direction of true unity, from the loosely aggregated cell colonies through the segmented animals, which can live in parts, to the higher organisms which act as true wholes. Moreover, even here there is a marked increase of centralisation as we pass from the frog, with its relatively independent cord and hind-brain, to man, whose whole functions are brought to an end by grave injury to the hemispheres. It is true, then, to say of the organism that neither parts nor whole could be what they are without one another, that as are the parts so is the whole, and as is the whole so must each part be. And this is the more true the more completely the ideal of our organism is realised. So far as we get independence of parts we trend towards the inorganic. If we advert to organic functions rather than structure, this will be clear. The organic functions we can only hope to understand in relation to the whole which they form. This relation is that on which the idea of function depends. Take any one of them, as the regulation of the bodily temperature. We can see fairly well from what we know of the chemistry of the body that the metabolic activity which constitutes (so to put it) the chemical aspect of life can only go on within certain limits of temperature. Accordingly we find a complicated set of nervous adjustments which, acting on the heart, arteries, skin, sweat glands, etc., adjust the temperature of the blood, in the baby and in his grandfather in Arctic snows and under a torrid sun, to $98^{\circ}\cdot4$ *as long as health is maintained*. But this machinery, like others, may get out of gear. It can only resist a certain amount of strain, and if this is exceeded it is liable to go wrong, and then the blood temperature rises or falls, and exhaustion or even death results. Now, here the organ is no longer per-

forming its function, but it still exists and still acts, only no longer in the way of maintaining the whole to which it belongs. So far, then, as perfection of adjustment fails, so far the organ is independent of the whole organism, and will go on working on its own account. Its existence, so far as it is ill-adjusted, depends on other factors besides the character of the whole to which it belongs.

It is here in part that we find the difference between an organism and a machine. If an express engine is overturned the driving-wheels may go on whirling aimlessly in the air as though nothing had happened. The steam goes on driving the piston to and fro, the piston-rod works the crank, and the crank turns the wheel regardless of the fact that the end for which they were brought into being is no more, and that the whole in which they were formed to be parts is a wreck. That is, they are relatively independent of the totality which constitutes the engine, still more of the purposes which the engine was built to serve.

All this illustrates by contrast or by limitation the ideal relation of the organism and its parts. In this ideal there is no determination *ab extra*, but all the parts are mutually interdependent while their precise arrangements would seem to depend on some general characteristics of the whole which they form. Now, it was some such conception as this to which our ideas of the final postulates of explanation seemed to lead us. The notion of an organism certainly loses much of its force if we cannot apply it to an eating and drinking, respiring and secreting, and perhaps sensitive and intelligent, being; but in the organic relation we seem to have the best hint for a notion of the whole of things so far as mere logic can give us any suggestion upon the matter.

One further misconception remains to be met. If the organic whole has an element of value, every part will necessarily contribute to this result; and by an easy but somewhat misleading process the system is thus regarded as a plan with a definite end. This is quasi-teleology. We have indeed here a relation of constituent conditions and result, but we have not the elements needed for teleology proper. We have no effort on the part of an intelligent mind, no process, no distinction of means and ends; we have not action for the sake of an end, but a certain good realised in a connected system, and there is no more teleology in the matter than if each element were of value on its own account. The relation of parts and whole, however, in this case counterfeits teleology, and we may speak of such realities as quasi-teleological wholes.

Any organism may be taken as an instance of quasi-teleology if we assume (what may indeed be open to grave doubt) that life is an end of value in itself. So, again, with a human society. And in both these cases the point of interest is that quasi-teleology is separated by ill-defined grades from real teleology. In either case the very same functions that have been performed in accordance with organic requirements may come to be done under the impulse of a conscious appreciation of the welfare of the whole, and with a view to maintaining or furthering it. Thus under a competitive system of industry the average man works for his own profit, and yet he produces corn or cotton or coal for the use of others, and the general benefit of society. This is due, not to his public spirit, but to his place in a social system, which entails this necessity upon him, if he is to make his living or his fortune. But in all societies there are some men—and in some social systems it might be all men—who feel that their work is for the social good, and who would adjust it accordingly. There is no greater mistake than to suppose human society to be at any time a perfect organism. So long as the primary object of each man is his own good, conduct, though doubtless kept within limits by the power and requirements of the social system, will never spontaneously and perfectly adjust itself to the needs of the whole, and so far there will always be friction.

In works of art we seem to find the organic and the teleological relation combined. To explain this, we may contrast the two extreme cases of a machine on the one hand and a picture or a poem on the other. A locomotive is a true teleological whole, in which every part has been brought into existence to serve a given end—to enable the machine to pull such a weight at such a speed with such an expenditure of coal. The "why" of any part of it is to be answered finally with reference to this end. Thus if we ask why the compound principle is introduced in this case, the answer ultimately is that by utilising the expansion of steam we get more horse power per hundredweight of coal consumed. Or if the question be, why this engine has a 3-feet driving wheel while that has a 7-feet, the difference is understood when it is explained that the first is a goods' engine, intended therefore to draw heavy weights at comparatively low speed, while the second is built more for speed than strength. But while every portion of the engine is designed for the "good" of the whole, there is no intrinsic value in any part. It would not matter a whit to the maker if every detail of the engine was altered as long as he could get the same tractive force on to the couplings of the

first carriage for the same expenditure. In this sense, the parts are irrelevant, and this differentiates the machine from the work of art in the ordinary sense. For, in the picture, each shade of colour has its value, and in the poem each line, however subordinate to the whole meaning, and however imperfect apart from the rest, has still a beauty of its own. The interest in a good novel is kept up from first to last. Here, then, is the true organic relation which is at the same time teleological. But even here it must be recollected that the whole is deemed teleological, not merely because organic, but because taken to have been planned and created by an intelligent mind, which has in this case a whole of the kind we have called organic as its end.

Neither mechanism, then, nor teleology seem possible categories into which the world-whole could fall. And we shall see reason to think that no category at present elaborated by thought is wholly adequate to this purpose. But the organic relation—understood in a broad sense—seems typical of the relation of whole and parts, and in applying it tentatively to the final whole of things, we at least keep clear of contradictions which beset the other categories, and therefore seem to find in it a more hopeful starting-point for thought. Within such a whole teleology may of course play its part, and so—equally of course—may mechanism. But wherever we say *ἡ γῆ ἐστὶν ἰuxta τὴν οὐσίαν*, we must be quite sure that the realised *οὐσία* has intelligible value. To assume—as some teleological systems seem to do—that it has value because it is perfect, i.e. complete, seems to reduce teleology itself to the level of mechanism. There is an attenuated teleology which sometimes takes on itself the function of a kind of copybook piety. Things are because they are good, and are good because they are. This kind of thing had better be left to the copybooks.

CHAPTER VII

KNOWLEDGE AND REALITY

So far we have been concerned with the form which knowledge would take if complete. The ideally perfect knowledge, we may say, would be a system like that described in the preceding chapter. But is perfect knowledge possible? or would the knowledge which we have described deal really with actual reality, with ultimate reality? Is the final nature of things in fact knowable?

To examine fairly the well-known difficulties which have been raised on this point, we must go over some of our old ground and bring to a head some of our main results as to the conditions and validity of knowledge. We shall then be able to deal with the main question, which is this: Are the conditions of knowledge such as to preclude us from understanding ultimate reality?

1. Our first question, then, is as to the conditions of knowledge, and may be put in the familiar form: What does the mind itself contribute to knowledge? Is there an *a priori* knowledge? Is some knowledge or all *a priori*? If there is no *a priori* knowledge, are there certain *a priori* conditions upon which knowledge rests?

What first are we to mean by *a priori*, and how are we to contrast it with the *a posteriori* or empirical? Of these, as of most similar terms, there are as many definitions as there are writers, and I do not know that any particular writer can claim to bind others. It will then be understood that our definition avowedly depends on the theory of knowledge already explained, and is intended primarily to aid in summing up that theory and bringing it to a clear issue. Looking to our theory, we see at once that the fundamental distinction throughout it is that which marks off the given from the various operations of the mind upon the given. If we take the given as our point of departure, all that is logically dependent on it will be *a posteriori* or empirical; all that is

independent of it, on the contrary, *a priori*, or the work of the mind. This being understood, what is the position of the "*a priori*" in knowledge?

We may clear some of the ground with a negative. Of pure *a priori* knowledge we have none at all, if our theory be true and the conditions it allows exhaustive. Every judgment and every inference, according to our view, starts from and rests on the given. But what, it may be asked, of the principles of inference themselves? We claim to know those principles, and they claim to be truths, to hold of reality; yet from the nature of the case—seeing that they extend beyond all that is "given"—we cannot say that their truth has been experienced. Then how is it known?

This leads us to a more positive statement. What is *a priori*, i.e. independent of the given, is always the function of the mind concerning the given. I do not remember because I experience memory, nor do I infer because I hear and see inferences at work. But as soon as contents are supplied to my apprehension, my mind fastens on them and sets these further activities to work. Apprehension itself is an activity which cannot indeed be exerted except upon some content, but which does not rely for its veracity or credibility on the character of its content. The various mental operations, then, diverse as they may be in character, agree in origin. They are not primarily "given," i.e. observed or apprehended. Or rather, they would exist, and their work would be in great part equally good and valid, though they should never be apprehended. For, in fact, they may themselves become objects of apprehension, as when I feel that I remember, or am aware that I am drawing an inference. But (a) they may exist, and work, and work correctly, without being matter of observation; and (b) they are not constructed by the mind from any observed materials. On the contrary, they must work upon the given material before there can be any question of construction or inference. This is what we mean, then, by calling the primary mental functions *a priori*. As functions they are *a priori* activities which the mind does not learn, but possesses independently of experience. As known facts, they are just as much matters of experience as anything else. I analyse, construct, remember, infer without learning to do so from experience; but the fact that I remember or the mode in which I infer are themselves matter of observation when I come to attend to my own mental operations. We stand, then, in full agreement with the position—no longer a novelty—that function, not formed knowledge, is *a priori*.

This denial must be carefully interpreted. Every inference, every judgment, nay, every apprehension, rests in part upon a subjective element. It is inevitably constituted and determined by one or more of the functions we have been so long describing. If we sought to realise the antithesis of the work of the mind and the product of experience in an opposition which should set up one class of facts as *purely* empirical, as free from all reliance upon activities of the mind, against the mixed and composite results that rest on memory or reasoning, we should find no reality to which our antithesis could apply. The purely *à posteriori* can no more be found than the absolutely *à priori* knowledge. Nor indeed was this required by the terms of our definition, nor can it (we may perhaps venture now to say) be required by any definition which should place the facts in any light-giving order. The "empirical" must mean the dependent on the given; but this dependence can be nothing except logical sequence in accordance with existing activities of thought. Similarly, the *à priori* was the independent of the given, and for this we found no verifiable example save the activities of thought themselves. Any ordinary judgment, then, is empirical as drawn from experience, but it is drawn from it by one or other of our modes of thought.

We are now better able to deal with the axioms of reasoning. We have seen in Chapter II. how these are logically formed. As to the special questions of their *à priori* or empirical character, we have only to apply the results there reached. They are formed first by analysis of our spontaneous methods of inference, i.e. by the empirical analysis of given modes of thought, and then by subsumption from this analysis, i.e. by applying the same spontaneous thought to the analysed result. As resting on analysis of and inference from the given, their character is accordingly empirical in the sense in which all knowledge is empirical. The only difference is the original nature of the given material. The generalisations which I form about the whiteness or the texture of the paper before me might be held "empirical," as grounded on some given facts of sense, colour, tactual properties, and the like. When we have classed these facts as "given," we have said our last word about them; they have no further kinship with the mind, no further play or importance in or interest for knowledge. But these mind-facts, it might be said, are different. Given as they are to the reflective consciousness, they are implicit long before they are made matter of reflection: they are *à priori* activities, and thus the knowledge derived from them should be called *à*

priori knowledge. I should call it rather knowledge of the *a priori*. For if we adhere in the term *a priori* to the meaning "knowledge that is independent of the given" we cannot predicate this of the principles in question,—firstly, because they are inferred from given modes of inference; and secondly, if this reason be repudiated by the above argument, because their certainty requires a verification into which experience enters. We have seen in Chapter II. that there are many modes of thought leading us in all security to contradictory results, on which account we declined to accept felt certainty, or *de facto* existence as a way of thinking, for a test of truth. If our theory of validity is correct, this test is to be found nowhere but in the convergence of many judgments on many methods, and concerning many points of reality. The principle which claims axiomatic value must make good its claim by performing an axiom's work: that is, ordering and harmonising given facts. Thus though we reject Mill's proof of the inductive axioms by generalisation from observed uniformity, we must admit this *de facto* uniformity of things as a negative condition of our adherence to these axioms. Should the world turn out otherwise than "uniform," should the character of its uniformity differ from that postulated by our axiom, we should have to find some other principle. It is only as the formulation of "successful" methods that the axioms have true logical weight, and these methods have succeeded because of their accord with the facts. Show us other methods that accord still better with the facts, i.e. that form a body of judgments more certain and more closely articulated, and you give us ground for a new principle that shall change the character of reasoning itself. I conclude that the axioms of reasoning rest on the given in a double sense: positively, they depend upon analysis of our spontaneous inference, and an equally spontaneous inference from this analysis; negatively, they rest on the success of those inferences, that is, their observed accordance with the facts, or (if you prefer it) the accordance of the multitudinous judgments derived by them from the multitude of facts given.

Lastly, the judgment of validity is in much the same position. The test of truth is the consilience of judgments. In so far as these judgments are formed from the given, it is empirical. In so far as they are formed by methods which the mind "contributes," and in so far as the mind judges of their consilience, it is *a priori*. The actual concrete test, then, is of the ordinary empirical character in the sense we have attached to that word. As to our belief that this is the true test, that we have seen to depend on an analysis of the idea of validity

in relation to what we can say empirically of our knowledge in general, in which again we get the same fusion of elements as is presented by the axioms just considered. We have, again, analysis and generalisation of our own methods of thought corrected or confirmed by the success which we meet with in carrying out those methods in experience. On the whole, then, we are justified in abiding by our formula. Our knowledge of the principles of validity and of the axioms of reasoning is, indeed, more dependent on the nature of the intellect itself than any other judgments we can adduce. But, inasmuch as their independence of other facts is not complete, there seems no reason for constituting it a nominally distinct class of knowledge—a distinction which would obliterate the fundamental fact that it is arrived at, like all knowledge, by the action of mental activities on given facts; and requires, like all knowledge, the consilience of other judgments to confirm it; that it is, in short, empirical as all knowledge is empirical.

2. Our conclusion here settles for us, further, our attitude to another famous antithesis. If we put apprehension with its content on the one side and call it sense, while we range all the other activities on the other and call them and their contents thought, we must clearly join hands with Locke in making sense to be logically the prior of the two. We can, on our principles, have no thought apart from sense, while we may have sense without thought. At the same time we are committed to an almost Kantian antithesis of these elements. We make no attempt to reduce thought to a retention or combination of sense elements. A combination of presented elements would still be a sensation; a retention of them, a continuous sensation; and between these states and that *assertion of the absent* which enters necessarily into judgment there is a gulf of disparateness fixed which no logical analysis can pass. For us, thought acting on sensation constitutes all knowledge except that of the immediately present. Beyond the here and now both elements are necessary; and whatever their ultimate explanation, neither in our view can be reduced to a form or modification or even an effect of the other.

But while recognising the "ultimate" character of thought and the fundamental importance of the part it plays in constituting knowledge, we must be careful to distinguish our position from that of Kant and his present-day followers. The understanding makes knowledge, but it does not make nature. Memory, construction, inference contribute, not to the nature of the given, not to make the given what it is, but merely to the judgments which we form about the given or about facts that

we suppose to resemble it. Thought, if our theory is true, is not reality; it is of reality. This divergence is fundamental to the whole nature and operation of thought. According to Kant, forms of thought entered actually into the determination of the sense presentation, and we saw above how that view led necessarily to relativity. According to the idealist development of Kant, the sensation was constituted by the work of thought, not in part, but altogether. According to the view taken in the present work, the sensation is not constituted by thought at all. There may be occasions when its content is wholly or in some respect determined, in accordance with special psychological laws, by the direction thought has taken or is taking, but in the sense in which idealists understand it we have seen no reason to regard apprehensions as dependent on thought or conception. Thought comes in when we go beyond the present, even if it be only to describe the present by assigning its general quality. But what does thought do? In its various forms, now so often enumerated, it simply enables us (1) to retain, to understand, to *know* the given in all its elements, and as a whole; (2) to infer a wider reality resembling that segment which we apprehend. Thus analysis brings special elements of the given into the focus of attention; memory asserts what has been given; construction makes of the given continuum a whole present at any moment of consciousness; the forms of inference find out the order and character of the given, and extend our knowledge to a wider reality; and finally, in bringing all these methods and their results to a test, we assure ourselves that the network of judgments thus fashioned is not a world of thought merely, but a system of thought truly representing a real world. At no point in our account of knowledge do we find thought as such determining the nature of the reality which it thinks. Each judgment claims truth of reality, and claims it on the ground of its special relation to the given. It stands or falls by comparison with the given; or, if that be impossible, with other judgments of similar claims. Consilience of judgments is the test of truth, not because harmonious judgment as such is reality, but because each judgment claims to assert reality, and its claim has a strength of its own so far as it goes. The claim and the test would alike be meaningless if thought constituted the reality which it thinks. Even the completest thought, the articulated system of judgments, is, and knows itself to be, distinct in its existence as a fact from the order with which it is acquainted. For the notion of a thought-determined reality we have had no evidence in the operations

of thought which the analysis of knowledge has compelled us to recognise ; while the idea is negated by the notion we have formed of apprehension on the one hand and judgment on the other. We know, or try to know, reality : not a world of our own making shut off from the truth of things, as the relativist would say ; not a world formed by intelligence for itself, as the idealist would have it, but simply a reality, the character of which in its elements and as a whole must be learned from itself, and not from the way in which we come to know it.

3. But to put aside all idealism, whether partial or thoroughgoing, there is a form of relativity from which we cannot escape. Granting that we know reality, no one could contend that we know it as a whole. That our knowledge is limited in time and space is clear ; that our sentience is limited is pretty evident. Who can suppose that the possible series of sounds is limited to the range of the keenest human ear ? Who can deny that there may be colours "above" the violet or "below" the red, or that a differently organised nervous system would give immediate and simple sense-reactions to the manifold forms of vibration that we know only by those effects which we call electrical phenomena ? The facts, alike of the physical and psychical order, point to the possibility of an extended range of sentience. The continuity of the physical stimuli of sensation makes it difficult to believe in any ultimate disparateness of character between such as cause sensation in us and such as are seemingly dark and dumb ; while the facts of individual variability, and of heightened powers within the individual under stress of abnormal excitements, combine with many appearances of animal sentience to suggest feelings and sources of feelings hitherto unexperienced.¹ All this, no doubt, is suggestion merely. No positive result can be based on it, and it serves merely to remind us of our actual limits, to show that our knowledge is confined (if I may so put it), not in quantity alone but in quality, not in extent but in internal character as well.

With the limitation of our perceptive faculties a much more important aspect of relativity is connected. We have seen how the data of sense form the material of our conceptions, and how these conceptions—such, for instance, as the causal relation, substantiality, or the self—once formed become for us for the future a kind of predetermined framework, like the Kantian categories, into which we think that our experience must be fitted. But these conceptions are formed, not only

¹ Cf., e.g., Lubbock, *Senses of Animals*, pp. 187-193.

from our limited experience, but by our limited powers of thought. Accordingly, though, if we allow that thought is valid at all, we must grant them the validity that falls to their share, we have no right to maintain that they express the whole reality of things. Ultimate reality they do express,—for all reality is ultimate,—and the distinction between the proximately and ultimately real should not be drawn. The real distinction is between the partial and the complete reality, and the mistake of thought against which the doctrine of relativity rightly protests is to treat its partial conceptions as exhausting the whole nature of the existence with which it has to deal. And this over-confidence brings its nemesis; for the time comes when the conceptions used will no longer fit the facts, and then arise the different shifts by which thought tries to make incompatible ends meet. The facts are denied on the strength of the conceptions; or the conceptions on the ground of the facts; or a general want of confidence in the whole work of thought is engendered, and we are landed in scepticism. The true remedy for all of which seems to be a constant revision of our structural concepts in the light which experience and our knowledge of their genesis may throw upon them,—a revision which, according to our view, will establish their validity as expressing certain sides of reality without justifying their claim to exhaust the nature of all that is.

To explain briefly by a few instances. The conception of substance is one of the most ubiquitous categories of daily usage, and for it we have seen a fairly simple logical justification. But this concept as ordinarily used leads to difficulties, if not to contradictions. For the contrast of the real being of the thing with its changing states, of its own nature from that which it does or suffers, follows naturally from the unreflective use of the concept as it stands, but leads to all the difficulties of "abstract being" on the one hand and of the *causa transiens* on the other. The way out of those contradictions—whether this way has been pursued successfully in foregoing chapters or not—seems to lie in treating all the observable phenomena of permanence and change as *primâ facie* of equal value, and, postulating that our conceptions rest logically on these phenomena, in seeing what way of conceiving the whole set of data arises naturally out of them. We criticise, not one conception in the light of another which we take as fixed, but all our conceptions in relation to one another, and to the facts to which they bear reference. We are thus able to assign a meaning of its own to the conception

of substance in which change and interaction no longer appear as self-contradictory. Similar difficulties arise in respect to the self—for example, the “interaction” of mind and body. It seems clear that the facts as we have them here will not fit into any categories that we possess in such a way as to explain themselves. The attempt to “conceive” correlation between a state of brain and a state of consciousness in this way or that way falls back baffled and helpless. If we speak of them as “two sides of the same thing” we yet have no real idea of the relation expressed by these terms. The connection, in short, is not really for us conceivable,—that is to say, we have not the data out of which the conceptions connecting these facts in the required way could be built up. We are forced to suppose that they are in fact mere fragments of the total reality involved in the process. So regarded, the problem ceases to present contradictions, but this further reality is a mere X necessary to the data, but unknown in its own character.

The relation of mind and body is only an extreme case of relations which we must take as *de facto* universal, but which we cannot explain or understand. We have suggested in an earlier chapter that the explanation of causal (i.e. universal) relations is a real possibility, and we have put forward certain forms in which such explanation may be found. But the vast mass of our inductive knowledge is but imperfectly reduced to such forms of explanation. The majority of the results of science we must take as *de facto* established by reasoning from experience, though their why and wherefore remains a mystery. In all these cases either further reality or further analysis is postulated by the demand of the intellect for a true understanding of things. No law gives us the *whole truth* about its data, until it is not only proved, but understood. At every point, then, in knowledge we are in contact with facts which we are constrained to take as mere elements in a wider whole. And here we see a ground for great reserve in—I will not say accepting, but—attaching any serious weight to the elaborate fabrics of hypothesis reared from time to time to “make the facts intelligible.” The purpose of the hypotheses is to understand the facts by means of conceptions which we already have, drawn from our experience as at present to hand; and the implicit or explicit claim made on their behalf is that you must either accept them or produce some other hypothesis to make the facts intelligible. This claim should, I think, be unhesitatingly rejected. The true way of “conceiving” the facts may as likely as not be only derivable from further study

in directions as yet perhaps unguessed. And if so, no conception that we could at present form would be adequate, for the very simple reason that the true data for forming it are not yet to hand. In all such cases it seems far wiser to fall back on the account which keeps closest to the simple facts as we have them. We know, say, the relation $A - B$ as a fact of sequence or coexistence in time and space. We have good reason in the broad principles of inference for generalising the relation. But "explain" it we cannot. It seems in such a case just as well to stop at the point justified by inference from observation as to play at understanding the facts by means of a fiction.

In these and similar cases we are open to two opposite temptations: first, to press our conceptions as final, and to determine that the facts shall be squeezed into them, no matter how; and secondly, when candour compels us to give up this game, to throw over our conceptions altogether as vehicles of genuine truth, to confine them to phenomena or appearance, or to suppose them merged in some higher conception in which their distinctive meaning is gone. The true lesson is that our thought is inadequate rather than inconsistent. It gives us reality as far as it goes, but it gives it us in part. We "strive always to the whole," but we gain the fragment. We are wrong if we take the fragment for the whole; and equally wrong if we take it for a fragment of something other than reality. It is real, but not the whole of reality.

4. A special, perhaps an extreme, case will illustrate our position. We have throughout treated space and time as modes of reality. Yet the attempt to conceive them as wholes leads to difficulties which, according to a well-known argument, amount to contradictions. Take space, and endeavour to sum up its parts into a whole. No sooner have you done so than you become aware that such a whole must be bounded, and that "advancing to the boundary you could still throw a javelin beyond." The whole is bounded, and the bound involves a beyond. Thus your attempt to conceive a final space-whole breaks down. Space, then, is infinite; but the infinite is *ex vi termini* inconceivable. For to conceive is somehow to grasp, to think a content as complete; and how can the infinite be completed without contradicting itself? Space, then, can be conceived neither as finite nor as infinite, and since these are the only possible alternatives, it follows that the existence of space involves a contradiction and cannot be accepted. The same argument will apply *mutatis mutandis* to time.

But the argument goes a step too far. Space, we are

satisfied, is not finite. And it is easy to infer, then it is infinite—for what is the infinite but the not-finite? Having established that space is infinite, it is then easy for us to argue that infinitude must be some positive conceivable character; and it is again easy to show that such a character cannot be conceived. But this result itself ought to show us that we must place the contradiction, not in the nature of space itself, but in our own argument. If the infinite as such is inconceivable, if, that is, no positive content can be grasped corresponding with the name, it remains to give it a purely negative meaning, and it becomes once more the not-finite. And thus the proposition "space is infinite" means neither more nor less than the original premiss, "space is not finite." It is the same negation put differently. We can now see how the fallacy comes in. We substitute "infinite" for "not finite" because they are the same; and then we assume that the infinite is something positive, that is, that they are different. Having assumed this positive meaning, we cannot substantiate it, and hence the contradiction.

The true result, then, is that the conception of space does not lead to contradiction, but that the attempt to conceive space as a whole breaks down. It ends in a negative. We can say of space and time only that they are not finite. Our thought is not self-contradictory, but it is inadequate to the whole.¹

¹ Kant's treatment of the first antinomy seems to suffer from two main defects. (1) Taking conceivability somewhat crudely as the test of truth, he assumes that the infinite must be a positive content, and shows that as such it is inconceivable. Some of his arguments, we may remark in passing, are strange enough. Why, e.g., should it take an infinite time to conceive infinite space? Does a yard take three times as long to conceive as a foot? But admitting his result, why, we must ask, must the infinite be a positive content? Because we may suppose him to answer, space and time, if real at all, must have some positive character, and their character is to be infinite. Perhaps so; but this "some" is a mere X, and we have never contended that we conceive it. Our conception of them is in this relation negative. Their nature, *whatever else* it may be, is at least such as to exclude finitude. This problematical positive character must be implied by our negation, but it does not follow that it must be explicitly conceived before we assert the negation. If we could not assert a fact until we knew and understood all its implications, knowledge could never begin at all. Everything we assert must be conceivable in the sense of meaning for us something. Nothing that we assert is conceivable in the sense that all it implies is fully understood. The destructive side of Kant's argument, then, rests on the illicit conversion of a pure negation or exclusion into an affirmative statement. (2) As to Kant's solution, it is difficult to see how we "solve" anything at all by depressing space and time to the rank of phenomena. For granting Kant's first point, that the conception of the infinite is contradictory, we are, on his showing, bound to conceive the phenomenal world as of that character. And yet this conception is to him impossible. That is, taking the phenomenal world as real (and to Kant it is real), we are forced to self-contradictory results. And we are wounded in our tenderest point. For it is our own *a priori* forms of sensibility which have done this thing to us. We are forced to admit that

Whatever, then, we know of space and time we are bound in describing them to end in one respect with a negation. And that is as much as to admit that our knowledge of them is incomplete. And in part we can trace this inadequacy to the character of our knowledge, and of the processes by which it is built up. For the wholes of our piecemeal experience are limited by other wholes, and the whole we would fain construct must *ex hypothesi* be limited by nothing beyond. Like them it should be a sum of parts, but unlike them it should be without a beyond. But in experience the rule is absolute—where the tale is complete, there is the limit; where the limit is not, there we have not yet completion. To conceive a whole which should violate this rule—in which the tale of parts should be complete, and which yet should know no limit from without—demands a remodelling of our conceptions, which, for reasons explained in an earlier chapter, we are not able to effect. It is a problem, an X which can only be defined as “not” being any-

space and time exist for us, but when we ask what they are, although they are forms of our own begetting, they turn out deceptive. We must then press the question, How can we continue to think of the spatial or temporal order as a real world of representations if it presents contradictory attributes? As Hegel has forcibly argued (*Wiss. d. Log., Einleitung*, vol. i. p. 28, cf. pp. 218-220 and 264-269), the contradictions, so far from being solved by Kant's conception, are merely transferred to our mental world, with the result that our mind becomes self-contradictory. “It is a too great tenderness for the world to remove the contradiction from it, to transfer it to our reason and let it remain there unsolved.” The lesson should be applied all round; it is a one-sided devotion to consistency which is satisfied by clearing some special sphere of contradictions, and effects its end by sweeping up all it can find and pitching them all anyhow into some lumber-room of phenomena, appearance, or what not. We should put ourselves the question fairly—can thought tolerate a contradiction? If it can, then the inconsistent can remain real. If, as we believe, it cannot, then we must expel it from thought's world altogether, and not have it lingering in a shadowland where, by a fresh inconsistency, it both is and is not.

If, trying to give some meaning to the appearance which is contrasted with reality, we examine the ground on which space and time are degraded to the level of appearances, we shall find that it involves the arbitrary assumption of a superiority in one mode of thought as compared with another. The conceptions in question are arrived at in some way by thought, and by thought again they are rejected. Which, then, of thought's works are we to trust? The second, says this view, because it rests on that “firmest principle of that which is,” the law of contradiction. Well, grant for the sake of argument that this law is the most sacred of all principles, still it has to be applied, and applied by thought, and why should the thought which applies it claim this unimpeachable validity? Doubtless, if we are convinced of contradiction we must admit error in the processes leading to it. But just as we test these processes by their mutual consistency, so we must test our ideas of what is consistent by those processes of thought and other sources of knowledge. And precisely in this case what appears inconsistent to one does not seem more than an unexplained difficulty to another. If, in fact, we assured ourselves that the conceptions were arrived at by methods which the mind could not avoid nor revise, and were yet for ever inconsistent, a general scepticism would seem to be the only logical result. We may err in our methods, but as long as we can

thing we can imagine. To this extent our failure can be traced to limitations of experience and thought.¹

There is another point. It has been ably shown that the infinite series crops up wherever we have homogeneous units capable of indefinite repetition without being affected thereby.² This, in fact, is what we mean by a *merely* quantitative extension. Now, space and time figure in our thought as thus homogeneous; but is our notion of space and time final? Both are in our view real; for they are elements in the given, and the whole single space and time we construct by a legitimate process from those data. But this is not to say that we know the whole nature of space and time—that what we know of them is the “ultimate” (i.e. complete) reality. Space and time, as we have them, are qualities of the real. Taking them in abstraction, we are wont to think of them as independently real entities conditioning existence. But this result, as it stands, is illegitimate. Space and time as known are implicated in the remainder of reality, and what conditions they may depend on is entirely unknown to us. What effect such further knowledge might have on our conception of their boundless extent is therefore a question which must be raised but cannot be answered. Would they, for instance, if fully understood, appear in that perfectly homogeneous character which lends

correct errors by reflection, this is not an adequate ground for general scepticism. But if an error has to be admitted running so deep in the structure of thought that no intellectual repentance can wash it out, to what principle or method shall we trust? Not a knowledge of reality still less an “absolute knowledge,” but a profound scepticism, can be the only logical result of exhibiting our thought as a network of inconsistencies. And to this I think we should be forced by admitting the contradictions of finite and infinite to be real and ultimate.

Hegel's positive treatment of infinity, though full of suggestiveness, is not as convincing as his criticism of Kant. Our old objections to his method would apply here, and we need not repeat them. Granted that finite and infinite imply one another, it does not follow that the finite becomes the infinite, or *vice versa*. And if we admit that the infinite which is excluded from the finite is a spurious infinite, it does not follow that finitude and infinitude cease to be distinct. The infinite will include the finite, and that is all there is to be said. And this will be simply another way of saying that any whole which we can perceive or conceive is bounded by a beyond, and this again means that no whole which we can conceive is ultimate. The true “*Schlecht-unendliche*” is the infinite masquerading as a positive content of thought.

Mr. Boanquet's discussion of infinite time and space (*Logic*, I. chap. iv.) is full of interest; but the difficulty is not met by drawing attention to the abstract character of the conception. The difficulty recurs in full force for the concrete whole of which space and time are aspects.

¹ It might be thought that the very conception of a whole not limited from without must be self-contradictory, since, if there is no limit, there can be no determination. But M. Renouvier has shown that a whole may be determined in number, space, or duration, not only by an external “enveloping” whole, but by or in terms of its own parts (*Essai de Critique Générale*, I. pp. 285–296).

² Boanquet, *loc. cit.*

itself to the construction of the infinite series, or would qualitative changes arise by a summation too slow to be evident to our senses?¹ We cannot tell. We can only see that if it were so the question of infinity would at once assume an entirely different shape.²

5. But now, if space and time form no whole intelligible to us, what of that whole of reality which all explanation seemed to postulate? In it space and time are features; and if so, it becomes boundless as they, and in becoming so seems to lose its character of an intelligible whole. But we must reply, the whole we are thinking of is not a whole of parts. We called it a whole because it is an individual character involving and involved by constituent elements, but we have no right to call it a sum of those elements or of anything else. It is the central character of reality, determining and determined by the position and action of whatever is constituted by it, as the melody by its notes. But unless we know, and know perfectly, what it is, we have no right to call it a sum or to treat its elements as necessarily finite. The melody itself may be infinite; a part of its character may be that it does not cease, and if so its parts must be innumerable. With all this we have no concern. Our business is with the constitutive relation which we find exemplified in the relation of empirical wholes to their parts, and by which we typify the ultimate character of things.

There is another sense in which we have spoken of reality

¹ I know nothing of "absolute geometry," but the reader will at once think of Helmholtz's sphere-dweller, or of Cantor's postulates of "elementary flatness."

² As indicated above, p. 184, the conception of the infinitesimal is a much less real difficulty than that of the infinite. When M. Renouvier (*op. cit.*, p. 217) argues that space cannot exist "in itself," because it must consist of parts without number, he misinterprets the nature of spatial divisions. Parts in a continuous whole are constituted solely by the movements of attention, and have no existence but for you who are making the division. Hence their number is just what you choose to make it. Again, to "conceive the infinite divisibility of matter" is not, as Mr. Spencer argues (*First Principles*, pt. I, chap. III), "mentally to follow out the divisions to infinity," but merely to recognize that the power of dividing in thought has no theoretical limit. As to physical divisibility, there is not the slightest theoretical ground for supposing it unlimited.

Mr. Spencer (*loc. cit.*), in arguing against the reality of space and time, objects to regarding them as attributes—1, because we cannot "conceive any entity of which they are attributes"; and 2 because "we cannot think of them as disappearing, even if everything else disappeared."

As to 1, the "entity" to which they belong is reality as a whole, and they are attributes in the sense that they characterize it, and could not be supposed to exist independently of its remaining characteristics. As to 2, Mr. Spencer must really speak for himself. For my own part I cannot take the first step of imagining "everything else to have disappeared," and so I cannot tell what I could or could not think under such circumstances. I can only say that in no case can I personally represent space and time as wholly void of sensuous content. I would add that these arguments, from what we can or cannot imagine under certain conditions which cannot occur, are of very doubtful value.

as a whole, and in which certainly it remains a whole which baffles our conception. The whole is more than any of its parts, and in speaking of the whole as the real we have meant to emphasise the contrast between truth as it is in its completeness and the scattered fragments of the lovely body which, Isis-like, we painfully gather together as we wander up and down the earth. Here, again, the nature of the whole must obviously be beyond the limits of our present powers of conception. *In this sense* we are forced to believe in the inconceivable. Now, to those who take conceivability as the test of truth, this is at once a contradiction. But to those who see in conceivability an ambiguous term, and therefore an untrustworthy test, the contradiction will disappear. Briefly, that which is ultimately and forever inconceivable cannot be true; that which our minds at any given stage of their development fail to conceive may be both true and intelligible at a higher stage. The whole growth of science has been a lesson in that form of intellectual humility which refuses to reject because it cannot yet understand. And at every step we have to believe in a something which we cannot, until we take the next step, define.

(6) We draw two conclusions which in a way counterbalance or compensate for one another. On the one hand, no word and no category of thought can adequately describe reality as a whole. Whether we think of it as material or spiritual, as personal or inanimate, we fall into the same error. We form the whole after the image of the part. Spirit and matter are conceptions which we form legitimately enough in our own experience. But the very fact that they can be formed within so restricted a sphere betrays their origin and limits their value. Arrived at by contrast and distinction, they are applied where contrast and distinction can have no meaning, and small wonder that so applied they lose meaning and life, and dying breed pestilence. On the other hand, everything we know is true of the whole in some way. All that is real is real within the whole, and so the whole has all the attributes which we recognise by thought or sense. And so far as one fact is more pregnant than another, so far as one concept is fuller and richer than another, so far it is less untrue to characterise the whole by that content rather than by another. But it is a question of degree of falsity. When we have chosen the fullest conception as the dominant feature of the real we are still in error, and wittingly in error if we omit what else we know.¹ Everything or nothing

¹ As we have seen in dealing with analysis, there is all the difference in the world between attributing an element to a whole and judging it to be the

goes to constitute the real. Everything may be fairly attributed to it, if everything else is treated alike. Unconscious innocence may sing—

"Morning's at seven,
God's in His heaven,
All's right with the world,"

but for conscious manhood to repeat it is a lie. As a glimpse of what can be, as one "soul-side" of reality, it is true, and deepest truth. But if one "side" differeth from another in glory, all sides must alike be real.

We do not know the whole, but all we know belongs to the whole. It may be asked whether these two positions are compatible? Can the part be understood without the whole; and if not, must we not admit a remodelling of our conceptions which would go deeper than we have granted? I would reply that there may be aspects of a part intelligible by themselves, and aspects intelligible only by reference to other parts, and that if this is so in the world of our experience we shall conceive it rightly in the first respect and wrongly in the second. An old analogy slightly modified may help us. Suppose, if we can conceive it, an intelligent being, wholly ignorant of human and even animal organisation, finding a severed human hand. It is clear that in some ways he could study it adequately enough. Its size and shape and parts would offer no difficulty. He could weigh and measure and dissect, and if a chemist, analyse its ultimate constituents. But the meaning or purpose of the hand as a hand would be unknown and unintelligible to him. His theory of the veins and arteries would clearly be defective, and the hypotheses by which he would explain the nerves would move our laughter. In short, so far as the hand

whole. There is the same difference in principle between the attribute which is merely assigned as one among others, and that which is assigned as the *dominant* fact in the whole. When we take a fact to be dominant merely because we find it in a whole, we make an entirely unwarranted assumption. Thus we find matter and motion everywhere and in everything, but we have no business to assume that it is the dominant fact anywhere or in anything. We may be able to prove it somewhere or in something, but that is another matter.

Of course, as the text admits, the reality which we fasten upon may be more or less important, and our view is accordingly more or less adequate. When we say in our haste that this is a miserable world, we merely express the side of things in which a probably worthless mood of our own is reflected. While that—

"The clouds which gather round the setting sun
Do take a sober colouring from the eye
That hath kept watch o'er men's mortality,"

expresses the balanced mood of a mature experience. But even here the "colouring" is subjective, *i.e.* the experience on which it rests is limited to the life of a single man.

tells its own tale he is safe enough. So far as it is dependent on the unknown organism he moves by guesswork. Now,—the final question comes,—how in our world can we tell which is which? By our only test of truth, the convergence of results from all sources. Are our theories supported by further reasoning? If so, well and good. They have substantiated their claim; the facts from which we drew them were in this case an adequate basis. They are as the shape or anatomy of the hand. If not, we must admit that their interpretation is to be found in some further reality; and, we may add, it may be that by searching we shall find the needed fragment.

Such of our conceptions, therefore, as are adequately grounded in experience need no merging in a higher unity. They are true of the real as they stand, and all that we know at all we know of the ultimate reality. It is only the thought that goes beyond its warrant—and that at present every conception of the dominant character of reality seems to do—which needs the might of the negative to control and correct it. What we know belongs to the whole, if it be but a footprint of the Eternal.

This is not all. The "fragment" in which our experience moves is not a dead limb severed from the trunk. There is no ultimate barrier to our thought. There is no ground for the view that we are confined to one plane while the centre and essence of things lies on another. All reality is on one plane; or to make the analogy more accurate, every plane of reality is open to thought. The very sense of limitation on which we have insisted means the opening of a fresh line of advance. For as long as the conceptions formed at a certain stage of experience were regarded as the ultimate measure of all things, the attempt to systematise experience was foredoomed to failure. It is only with the recognition of the limited value of our most fundamental conceptions that the attempt becomes possible. In this way the doctrine of relativity, which seems so negative and valueless, turns into a positive help.

Every advance in knowledge is a step towards a better understanding of the nature of the whole. Detail and generalisation, minute historical fact and fundamental biological law, are all matter for the great synthesis. We have seen in our own time how a master mind could use the seemingly trifling details noted by a pigeon-fancier here, or a breeder of shorthorns there, and weld them with the results of Cuvier and Lyell into a theory which has remodelled the foundations of thought. And such synthesis requires con-

stantly to be re-made from the ever accumulating data. It is never the whole truth, but in the hands of inspired patience it is nearer the truth at each stage of its making. And just as Darwin's system confronted old conceptions with further facts, and gave a new meaning to the worn-out forms of species and genus, so every great discovery tends in its measure, not to overthrow, but to recast the thought-moulds by which we judge things. The time comes when the bare analysis of a conception ceases to give fresh light, and then if it remains unsatisfactory the remedy is a fresh array of fact to confront it with. The case of personality at the present moment will serve as an illustration. The mere growth of fact, the mere extension of observations, has been a more potent factor in shaking our conceptions of a person and a responsible agent than a library of dissertations on the ego and the freedom of the will.

The system of knowledge is always in the making, and always on the two lines we have tried to indicate, on the one hand extending its domain, on the other reconstructing the conceptions which form its main lines of internal communication. No doubt the thought of primitive man—or, for that matter, of primitive ape—contains all our conceptions in germ, but the vast difference can hardly be ignored. And if we may forecast, it would seem likely that the remoulding of thought may proceed more quickly rather than more slowly, and go further than it has already gone. At least, our conceptions might take heart when they compare their obvious inadequacy, their raggedness and uncertainty of outline, with the neat thought-moulds of an earlier philosophic generation, and claim that

"The artificer's hand is not arrested

With us; we are rough-hewn, nowise polished.

They stand for our copy, and once invented

With all they can teach we shall see them abolished."

The doctrine of relativity, then, as we hold it, means no more than an admission or insistence that our knowledge and understanding of reality is limited by our powers of observation and thought, and that neither of these, as they stand at present, will enable us to grasp the whole structure of things. It does not mean that "our world" is separated by a brick wall from true reality; nor does it mean that we are confined for ever to one piece of reality fenced off from the rest. On the contrary, our thought develops side by side with our observation. They widen and deepen together. Our conceptions are not made of cast-iron. They grow with experience, and adapt themselves to a wider knowledge. The very discontent which

has begotten the doctrine of relativity is active in the process of remodelling, for here as elsewhere, discontent is the mother of improvement. The wider whole, then, the problematic X which is almost everywhere to seek, is no "unknowable," no surd in the equation. It is not separated by a hard and fast barrier from the conquered territory of knowledge, but the frontier line is constantly advancing. It is not without reason or justice that all shortcomings and puzzles notwithstanding,

"Still we say as we go,
Strange to think by the way,
Whatever there is to know
That we shall know one day."

CHAPTER VIII

FOUNDATIONS OF KNOWLEDGE AND BELIEF

ASSUMING as the result of our last chapter that knowledge based on the methods described is, so far as it goes, genuine knowledge of reality, and ultimate reality, we must raise the further question, Is our account complete? Are the methods which we have recognised all the methods which we possess, or are there other and perhaps shorter cuts to truth? It is clear that on our theory of validity no belief, or "method" of forming a belief, could claim the right to interfere with any of the results of a compactly organised system of judgments. If such a system exists, based on the methods which we have recognised, it must be taken as true so far as it goes. But it is quite possible that there should be other methods of obtaining truth which, without conflicting with results otherwise established, should carry us further and give a wider scope, if not to our certain knowledge, at least to our belief and hope.

I. We have then to ask whether the postulates of knowledge enumerated by us can be reasonably taken as exhaustive and final. This makes it necessary to inquire what value the methods we have all along pursued really possess, and as such it is not an unfitting subject for a concluding chapter.

(1) Our method, then, has been to begin with the observation of certain mental operations, such, for instance, as apprehension or the judgment. Its main difficulty here is to analyse the operation accurately, but supposing that done, its next business is to see how far such an operation will carry it, what sphere of knowledge it covers; and so far as any given belief can be explained by this operation alone, it concludes that no other operation is to be postulated. In this last point its method is hypothetical, and it is only now and then that we can confirm it with a negative instance, as when Locke remarks that the blind man has no idea of colour. Apprehension, analysis, construction, and memory, even inference, may all, I suppose, be observed. That is, attending to our

own activities, we find ourselves apprehending, analysing, or inferring, and the "explanation" of a certain number of judgments by means of these activities is a hypothesis against which, so far as the explanation is satisfactory, no reason can be alleged, and which has such grounds as we have endeavoured to point out.

(2) The second stage of our method is based on the content of assertions. Take any content you like,—the cow which I see out there in the field, a sentence from a novel, a mathematical treatise,—how did it get itself presented? What elements have gone together to build it up? We ask these questions of the content of our belief just as the geologist may ask them about a stratum or the embryologist about a structure. And just as the geologist tries to find a certain simple set of factors all verifiable in actual experience to explain the innumerable complexities of the earth's structure, so we try first the activities which we know, which we can observe within ourselves, and seek to explain the contents in question by this means. Our method, then, is a hypothetical reconstruction of our data from known elements, and must submit to the ordinary tests of such a method.

Now, such an explanation as we have suggested may have more than one object. On the one hand, it may aim at explaining how a given content comes to be thought at all. In this case it is a psychological explanation. Or it may explain the conditions under which the thought will be valid. Then it will be a logical explanation. The two tend to coincidence, but do not reach it.

The logical postulates, in which we are primarily interested, are expressible in certain abstract judgments. These judgments, of course, vary a good deal in character. In such a case as memory the postulate is merely that a remembered content may generally be taken as true. Taken as an attempt to explain or justify memory by something else, this is obviously as barren as it can be. Its real service is simply to group together a certain class of judgments, and declare that they have a claim of their own to be valid; that this claim is *sui generis*; that it is common to them all, and that any further judgment may be so far trusted as it rests on the same basis.

Even as a psychological position, the reference of the memory-judgment to memory has a certain meaning as long as it is not regarded as an explanation. Much contempt has been poured on the whole notion of "faculties," but within proper limits the conception must be retained. You may know nothing of the cause from which certain effects follow, but you assign it a provisional name for purposes of reference. You

speak of "electricity" with familiar confidence, meaning that condition of matter, whatever it may be, which issues in this and that palpable effect. In the same way you trace hypothetically the results of a nervous change without knowing what that change is. And so with a "faculty." It is a general expression which explains nothing, but serves to group a certain number of mental facts together. In the same way that "I can trust my memory" or "that that which comes to me as a remembered content may be taken as true" is a general postulate not explaining why memory-judgments must be true, but showing what precisely our acceptance of them implies—showing, in short, that they stand and fall together, but separately from other groups of judgments.

The postulate is more clearly fruitful when a distinct relation, *m*, between two assertions *A* and *B*, can be assigned; then the assertion of the second content on the ground of the first is a process with a clearly marked character of its own; there is a definite step made by thought, and the postulate is that such a step is justified. Analysis and construction fall under this head; whether there are distinct "faculties" of analysing and constructing is indifferent to logic. We postulate only that when *B* is related to *A* by the relation *m*, of analysis, or the relation *n*, of construction, then *B* may be taken as a true consequent of *A*.

Now, supposing these postulates ascertained, the next thing is to determine how far they will carry us, and here again we can only proceed by a hypothetical method. That is, assuming such and such conditions we can explain this and that class of judgments, and we may refuse to assume anything further as an ultimate postulate of thought until we come to some result where our explanation definitely fails. If we find no such result, our assumptions stand as a good hypothetical account of the postulates of knowledge, but their logical probability will depend on the extent and representative character of the branches of knowledge explained. Now, the postulates so far instanced—memory, analysis, and so on—might be taken as being at bottom forms of mental activity. However this may be, we have also postulated certain truths which take us altogether beyond the sphere of mental operations, but which are conditions of knowledge in this sense, that, so far as we can see, if they do not hold our reasonings are not warranted, and may at any point break down. In these instances there is no question of a mental operation, yet the logic of the matter is not widely different. First, the truth of the principles is established by analyses and inferences, which we have already

described; and then these principles are applied—and here again we have the hypothetical method—to explain all manner of inferences held to be valid and to act as a touchstone to distinguish true and false. I call it a hypothetical method because here again there might conceivably be other principles which would act similarly as grounds of truth and tests of certainty, but as long as we can explain all valid inferences by principles that we have already assumed we can have no reason to cast about for more.

(3) This brings us to the last point in our theory of our own method. At least down to the end of Pt. II. it was assumed that we could distinguish false and true, valid and unsound, and to many this might seem for a logician to be precisely the unwarrantable assumption. Surely, they might say, the object of logic is precisely not to take truth as you find it, not to make assumptions and go on from these to a conclusion, but to find some principle above assumption by which we can precisely tell what methods of reasoning are good, and then advance from sound premisses by these well-tested methods to our conclusions. But if there is any truth in our theory of validity it will dispel this treacherous idea, which has indeed been a will-o'-the-wisp to many a philosophic system. If we stand to our view of the coherent system of judgments as the true source of validity, we must recognise that while logical analyses are difficult to make, and harder to support by confluence of evidence, popular knowledge, and still more, scientific systems, present the logician with bodies of articulated knowledge ready made. At least until our logical system is as interconnected and self-supported as each science, it must take its facts from the sciences rather than prescribe laws to them. No doubt it is possible that when in the theory of knowledge we have established a chain, or rather network, of truth secured in itself beyond reasonable doubt, we may find it necessary to modify this or that scientific position, to overthrow this or that popular conception, but till that time arrives logic must take every coherent mass of judgments that it finds, as being for it so much fact which it must explain as best it can. The whole history of philosophy has shown that no subject is more difficult than the nature of knowledge itself; in no subject, therefore, have we been so far from succeeding in the formation of such a system of truth as can be called an established science. In no science, therefore, are we so clearly called upon to take on trust, at least provisionally, the results reached in other departments of study.

Putting these points together, we find that logical theory.

dealing with the facts of assertion, takes both assertions and the belief in their validity from the body of pre-existing knowledge, popular or scientific; that, its object being to determine whether this or any other knowledge is valid, and if so why, it first looks out for activities and general truths which will explain specimen assertions, and, having found them, assumes as a hypothesis that the same postulates will suffice to justify all valid belief. If, then, we can explain any great body of belief by these postulates, we at once verify this hypothesis, test our belief by them and test them by our original belief. So far, then, we may be said to have proof. If our reasonings have been sound at all, the methods we have postulated must exist, and must account for and justify a considerable portion of our knowledge.

II. But when we go beyond this we fall back into a region of hypothesis where verification is, to say the least, extremely difficult. Are our methods exhaustive? Are they the only roads to truth? Here we have to be far more cautious about our answer. That they account for much of our knowledge we feel certain. That they may account for all of it that is sound is at least possible in the absence of clear facts to the contrary. But whether it is really so or not is a question in some degree left open by the nature of our discussion. Our methods may be good as far as they go, and yet there may be others which we have omitted. Whether these others are trustworthy is a question which must be settled on its own merits by the regular criteria of validity.

Now, there are in reality other methods of forming, or at least modifying, *belief* than those we have enumerated. The martyr's faith, the hope and trust that are quenched not, the charity that believeth no evil, the woman's intuition, the absorbing presentiment, the despair of morbid health, are all states of mind tending to affect belief. And if the logical Pharisee bids us disregard all these deflections on the right hand and fallings-away on the left and keep our eyes fixed on the facts and the argument, where, we might ask him, gets he the intellectual force for this feat but from the purely moral and unintellectual force of will? That there is no purely intellectual state of mind has become a platitude, but every element in consciousness, emotional, volitional, or other, does and must influence estimation of evidence and resultant belief. I do not deal here with the more difficult question as to the actual origination of ideas or judgments by some of these new methods. That they influence belief, that they lead to the indignant rejection of mathematical or quasi-

mathematical demonstration, that they convert the merest imaginative suggestion to the white heat of certainty is enough for us. We must admit the fact that such methods modify belief. Our question is, How does that affect our present position?

In general theory—and we cannot in the present work go further—this question is not difficult to answer. Every method of forming, modifying, or abolishing belief has by our theory of validity an equal *prima facie* claim to a hearing. Eminently unreasonable are those apostles of reason who make broad their major premisses and intricate their chains of abstract reasoning, pouring the while unutterable scorn on the teachings of the heart. What our feelings fain would teach us must be listened to, regarded, and weighed by the lover of truth, who can afford to neglect no indication of the right way, no matter whence or in what garb it comes. But there is another side to the question. Each method, to be permanently accepted in our mental constitution and to gain weight in its councils, must present itself as the accredited principle of an organised, correlated body of judgments. Otherwise it has the weight of an isolated belief, no more and no less.

Herein lies the difficulty of the methods now under consideration. The calmly reasonable man learns to discount his own moods. He abates his sanguineness and puts off despondency, precisely because experience has taught him that neither of these give a verdict he can trust. Their results are confused, contradicted by one another, and the facts; no order can be evoked from them. So is it with many another "method"; and as long as it is so, none can claim to count alongside of, much less to weigh against, the orderly systems derived from observation and inference. But is it so with all? Are all alike untrustworthy; or are there any of the methods commonly dismissed as unscientific which deserve more consideration? Two main methods here claim our attention.

(1) The tendency of science is analytic. It breaks up conceptions into elements, or puts together elements of thought into connected wholes. By this process of reducing things to their elements (or reconstructing them from their elements) it arrives at that articulation of beliefs which constitutes proof, demonstrated knowledge. And the tendency of logic is to follow science as being knowledge *par excellence*, as giving it results to explain in the most definite and precise form discoverable. But of course there is much knowledge which is not science, much that is good, sound, indispensable



knowledge too. But such knowledge is arrived at on what we may call a more concrete method; it takes things as a whole without waiting for analysis. It is content to discover, and it leaves it to others to prove. Insight, intuition, readiness, comprehensive grasp are its methods. Now, in science this is the knowledge of the discoverer, and its results, so far from antagonising the methods of science proper, are constantly confirmed by it in essence if not in detail. But in common life we cannot always stay to verify, and in our hand-to-mouth intellectual existence the unverified, inarticulate results of concrete thought form our ordinary means of subsistence. In fact, articulation is a matter of degree, and it may well go far enough for practical purposes without reaching scientific, *i.e.* unfailing, demonstration. In proportion as proof or articulation diminishes, our conclusions get more risky, and everything comes to depend more and more on the character of the individual mind. He who, whether by genius or training, is so fortunately constituted that his belief is influenced by just the right considerations, who, without analysing or proving, concludes just as though he had proved or analysed, will succeed in practical life, and wherever this "concrete thought" is needed. And we may add, this success hardly comes about without the aid of the methods of analysis. For experience, testing and correcting our actual modes of thought, brings them without our knowing it into line with those which analysis would prescribe. Hence the ablest man in this direction is he who learns most rapidly and successfully from experience the way in which his powers should be used.

To pass to the "truth of imagination," much the same results hold. The "concrete method" is here, we may say, the explicitly adopted principle. The picture, or the drama, or the novel will in the main (though here too there are all degrees) give us truth by "demonstrating" in the concrete, not the articulated, universalised, dried-up, abstract, accurate, unpleasing skeleton of truth, but the warm flesh and blood of life, truer at once and less true than the skeleton; not accurate except by a "divine chance," but containing much more than we can ever reduce to accurate terms. The highest art, we may say, is just that which presents the facts best; but the facts are deeper and higher and more subtle than those which other thought can reach. The true ideal does not go beyond truth, but reaches to the deepest truth—not in "some place above the heavens," but "before our eyes and between our hands" it shows us what is best. But if the

highest art is that which gives us most of truth, so the most imaginative genius is also the most logical. Trampling on all forms, it yet avoids inconsistency and unwarrantable assumption. It does what logic prescribes, though not in the way logic prescribes.¹ Genius in this respect is just the power of seizing the essential point without knowing the rules which determine it.

Thus the concrete method—the method of practice and imagination—is the needed supplement of the abstract thought of science and logic. It is the vanguard of the advancing intelligence constantly spreading itself over new territory which the cautious and deliberate main body of proof will hereafter fortify and secure. It is from another point of view the needed corrective of abstract thought. That which we can prove is always so small a fragment of what we really know that our view confined to it becomes partial, narrow, and lifeless; whence, to avoid pedantry and stagnation, we are bound constantly to reascend to some more commanding point from which we may obtain some prospect over our own domain. The purely analytic mind can never see the wood for the trees.

(2) So far we have thought of the "concrete" method only as the least explicit form of thought, resting essentially on the same data but careless of articulate expression. We have yet to ask whether there are any quite separate sources of belief worthy of our credence. In a word, if we give the name of faith to any method of forming a belief other than those we have described, is any sphere possible for "faith" on our principles? This clearly will depend on the point mentioned above. If those inexplicit and inarticulate methods which we call faith tend in any way to substantiate one another and so show a *prima facie* claim on our acceptance, then there may still be a sphere for the faith that passes knowledge. And hence for the apologist of faith, as a method of obtaining truth, the question is simply this—Is there, after all contradictions are allowed for, still in the last analysis some truth, however inarticulate, to which all faith in all the faithful has still borne witness? Or, to put it more broadly, Is there any centre round which any great mass of inarticulate but independent and not inconsistent convictions arrange themselves?

That there may be some such background of reality, such core of solid value, amid much that is evanescent and admittedly delusive, is suggested by at least one important characteristic of the mode of belief that we have called

¹ Cf. Comte's conception of a *logique spontanée*.

faith. Like difficult or unpleasant truths grounded in reason, the highest hopes that are built on faith, however often you expel them with a pitchfork, will come back ever again. You settle in quietly and decisively to observation and comparison and searching inductive tests, emancipated from all delusions and credulities, when there comes the far-off memory of music, the spell of a long-forgotten name—

"A sunset-touch,
 A fancy from a flower-bell, some one's death,
 A chorus ending from Euripides,—
 And that's enough for fifty hopes and fears
 As old and new at once as nature's self,
 To rmp and knock and enter in our soul."

Faith of some kind is unquenchable;¹ but faith in what? Could we answer that question, the first part of our task would be done.

Let us for a moment suppose it answered. Let that unanalysed form of belief which men call faith be supposed to concentrate itself on some point, to present focused on that point some system of belief which could be expressed and formulated without internal contradiction, the next step logically would be to compare this result with the body of judgments already ascertained on the methods already recognised. If there were no contradiction, well and good. If there were, a process of modification would be necessitated, as in other cases of a collision between two bodies of belief. There would be no subordination of faith to reason, if reason means an arbitrary preference for one method of forming judgments over another. There would be a total subordination of faith and inference alike to reason, if reason means, as it should mean, the universal harmony of the whole. And from this follows necessarily, that where harmony is an established fact, it is preferred to random and chaotic beliefs, which may be felt with much fervour but cannot justify themselves by coherence with one another or with our other ways of thinking. Now, if the results of "observation and inference" actually form, in the main, a harmonious system of beliefs, this is a clear ground in reason, as we understand it, for preferring them in case of conflict. The result, in our view, is that the true function of every unanalysed method, and of faith among the rest, is not to wage a hopeless war with the

¹ The claim of feeling to influence belief has been strongly insisted on by Comte, *Synthese Subjective*, Introd. esp. p. 23. The above account of the matter, together with what follows, was suggested by a remark which I heard some years ago from Mr. T. C. Snow, of St. John's College, and which I have incorporated in the text.

compact masses of scientific truth, but to range beyond and above, gaining for us the right to feel what we cannot yet express and to hope what we cannot yet substantiate.¹

A fair field and no favour is what logic secures for faith, and it can give no more. The rest must come from faith herself. When she can formulate her creed intelligibly, and above all consistently, then reason's dealings with her begins. As long as she can agree with herself in nothing more definite than

"The desire of the moth for the star,
Of the night for the morrow;
The devotion to something afar
From the sphere of our sorrow,"

she has not substance enough for logical treatment.

There seems to be one such "centre of faith" for which the logician himself is bound to contend. We have seen that knowledge outstrips science, and it is equally true that science outstrips logic. The fact comes ordinarily before the reason why. Men sailed ships before navigation became a science; they used wheels and pulleys before they invented mechanics; and we may add, they walked before they learnt anything about nerves and muscles. The distinction of the reasonable and unreasonable is older than the earliest attempt at logic or science, and to this day he would be a bold logician who should claim to have defined it adequately. As thought advances, reason becomes more and more a thing that we grasp; but it is still in part, what it once was wholly, a thing which

¹ There is thus all the difference in the world between a "faith" which merely claims to be one method, and that an imperfect and half-inarticulate method, of searching after truth, and the faith that claims to supersede or dictate terms to reason. What is true cannot ultimately be irrational, and those who would shield the highest things of life from reason's test simply prove that their trust and belief in those things is faint-hearted and afraid. To argue, like Mr. Balfour (*Foundations of Belief*, part iv. chap. iv.; cf. chap. vi. pp. 335, 336), from difficulties in the scientific order to a sort of general permission to construct a theology which we cannot prove, involving difficulties which we cannot explain, is to travesty logic. You may take two views of reality as interpreted by science and common sense. Either you may hold (as we have done in this work) that it presents no ultimate contradiction and then *cadit questio*; or you may hold that, taken as *ultimate* reality, it is in one or more points self-contradictory, and then you are bound to deny that it can be taken as ultimate reality. Every thinker of repute, from Kant and Hegel to Mr. Bradley and Mr. Spencer, who has held to the existence of insoluble contradictions in the scientific order has also held that order to be in some way or other an apparent or phenomenal, as opposed to ultimate, reality. To take the self-contradictory as real, in so far as it is self-contradictory, is a mistake which can not be imputed to any philosopher of eminence. If science, or any particular interpretation of science, involves us in contradictions, this, so far from being a warrant for any other theories involving us in fresh contradictions, simply dissolves science itself, or that particular inter-

we divine. And this presentiment of reason, held with courage and tenacity, is a form of faith of which too little has been said,—faith in reason itself. Reason, when she comes into her kingdom, will be an ungrateful queen if she wholly banishes this tried servant of her exile to the lands of illusion. And this faith at least might claim that, tested by success, she must be adjudged valid.

There is another faith, or rather another form of this same faith in reason, which by the same test would seem to have strong claims. Practice and moral theory, moral conduct and the moral law, stand to one another, as Aristotle taught us long ago, pretty much as the *dei* and the *dém* in the world of knowledge. Men die for their children, pay their debts, and clothe the naked first, and afterwards wonder why they do so. Here the ultimate reason why, the final rationality of the moral order, would seem still further from our grasp. But it is precisely by the divination of the highest, and blind adherence to it through evil report and good report, that the world is moved. In this sphere it is the dream that is the reality; it is here that it is possible

"To hope till hope creates
 From its own wreck the thing it contemplates."

The ignorance which does not know when it is beaten will destroy many syllogisms.

Faith of this kind is strong simply because it is the tenacious adherence to the highest convictions that a man has

pretation of it. As to laws or facts at present unexplained, if they are *proved* well and good. We may believe them though we do not yet understand them. But this is no reason for inventing fresh theories which we can neither understand nor prove.

The suggestion that science itself implies faith contains a certain core of truth which we notice lower down, though it is a very fatal truth to any faith which should run counter to the order established by science. But when we are told by Mr. Balfour see, *et c.*, p. 237, that such presuppositions of science as the existence of an independent material world, rest on a form of faith, we must remark that this view can only rest on a total misapprehension of the elements of the question under consideration. The "independence of the material world," as required by science and common sense, is a simple and obvious inference from the facts of perception, with nothing irrational about it. How ultimately this independence is to be interpreted is a point on which thinkers have differed and differ, but no one that I know of at present would call in faith to back up his interpretation. The metaphysical question from Berkeley onwards has been—what sort of independence is postulated by perception, that is, not whether confidence in perception is well grounded, but what perception conveys. What science postulates is the reality of the perceived fact, and the conformity of its behaviour to uniform laws. These are admitted equally by the Berkeleyan and the realist, and so far from being tenets of faith, the one is the starting point and the other the vital principle of all reasoning.

grasped. But what is highest may appear in many garbs and in very different measure to different men or at different epochs. Hence the inevitable conflict of faiths when faith is not guided by reason. And here comes out the difference between true faith and false. The weaker and lower faith dares not expose itself to criticism; it inverts its function and opposes the higher truth which it ought to welcome and cherish. *Corruptio optimi pessima*: this faith is the worst enemy of reason, and was not unjustly called the "vilest birth of time." The truer and stronger faith is simply the belief that the more we know the more the truth will harmonise with all that is best within us; and this is simply another form of the belief in reason, since reason is in essence nothing other than a many-sided harmony. And if the narrow belief that will not learn is strong for the time, and carries things with a rush, the wider conviction of reason is always silently at work wearing out prejudice and hate, and grinding down the fabric of dogma slowly but remorselessly like the mills of God.

Objection may be taken to the use of the term faith in the above discussion as meaning either too much or too little. The word is a matter of indifference, and I would put my meaning in this way. I would say that this much at least follows certainly from our whole theory of knowledge. Faith or no faith, no truth can be final or complete which is not in harmony with the whole of our nature so far as our nature is consistent with itself.¹ It is on each and all of our impulses to think and believe that our knowledge logically rests. And of these none is before or after the other, none is greater or less than another. Only they must harmonise with one another. And that reality, and only that reality in which such a harmonious whole could find rest, is the only reality we can logically take as true. Feeling, imagination, emotion, the moral will, thought, all so far as self-consistent, claim a determining voice in the system of belief which we finally accept as the system of knowledge. Until all these claims are satisfied, thought, we may be sure, will never rest. And here we have sight of that which would be the true and final explanation of all that is. Such explanation would not be found in the barren substitution of teleology for mechanism. Nature and life would not necessarily seem better because planned. They might seem worse. For my own part, I would rather think that the worst things arose through a blind mechanical necessity than that any plan had been made bad enough to design them. But the true conception of reality

¹ Cf. Balfour, *Foundations of Belief*, concluding page.

will be a truth that we can feel and will as well as think, a truth resting, not merely on its abstract form, but on the fulness of many-sided satisfaction that it will bring. No truth short of this will ever be accepted by thinking men, nor could it be logically accepted by reasonable men, as the whole of things.

In this harmony the body of scientific truth already formed would find its place, not overthrown but completed and fulfilled. In fact, the articulated work of thought is the model for all further thinking, as well as the best explicit account of reality that we possess. True faith as opposed to false is in one word the anticipation of a harmony which shall be complete.

III. This brings us to the main contribution which the theory of knowledge can make to philosophy. The object of philosophy is to understand reality, to find out "what the existent is." The answer to this question has been sought often enough in the theory of knowledge itself. The endeavour has been made to deal with it by the analysis of our conceptions, or of the conditions under which they arise, and to prove that they postulate a reality of such or such a character. We have tried at various points to show that the arguments relied on for this proof were untrustworthy, and it would follow from our whole theory that logic alone could not make clear to us the dominant character of the real. Again, the theory of knowledge has been held to prove that genuine reality, the *Werk*, is for ever unknowable, and that result also we have tried to combat. From these negative results our positive conclusion emerges. In science and in common sense we are in contact with reality. In some dimmer, less articulate fashion we learn truth also through feeling and imagination. The best and soundest view we can give of things is by synthesis of all methods. The system of philosophy to which our theory would serve as an introduction would be a correlation of the results of science, physical and social, in which an attempt to understand what poetry and human nature mean would not be left out. The great permanent laws of nature, the broad outlines of biological and historical development, and the analysis of the moral consciousness would all enter into its scope. And finally, in summing up its results, what is already reduced to systematic order, i.e. to science, our philosophy would take as true and finally true, but not as the whole of truth. It would recognise an ore of truth in the presentiment which we cannot prove, and would be trying always to extract the metal from

the ore. It would be conscious of limitation, but within its own limits would be confident of truth. This is no new view,—it is as old, we might say, as philosophy itself; but as new difficulties arise it requires constantly to be restated, and the form in which it can be put forward has to be conceived anew. To meet this requirement has been the main purpose of the present work.

The position of knowledge, as we conceive it, may now be described in a few sentences. Dependent on sentence and thought, it implies a mind which thinks and feels; and though both thought and feeling may influence and modify each other, the beginning of knowledge implies the operation of both, nor can either spring from or be logically deduced from the other. The object of knowledge is a world of reality, consisting partly of mental phenomena, partly of an order external to the knowing subject. Of this order it is acquainted with but a fraction, though many of its principles claim validity over the whole sphere of existence. But the order, so far as it is known, has an "absolute" reality, i.e. one that is not dependent for its existence on the fact that it is known, not coloured in its nature by the activities employed in cognition. Lastly, there are certain methods of forming belief which produce a harmonious system of thought, and these test themselves and one another. Their results we must accept as true, but we must recognise that there are other ways of forming or influencing belief of which we at least can give no clear account, but in which it may well be that some precious method of obtaining truth lies buried in the rubbish of prejudice and confusion. Such methods, if themselves harmonious, may yet be found greatly to extend our knowledge in spheres to which the humbler principles on which we have relied can hardly lead us. But for them also the same criterion holds good. They must fall into line, first with one another, and next with the whole mass of our judgments, before their results can be taken as established fact. An established circle of knowledge in the vastness of reality, a circle that widens day by day, and may in the future be extended by methods which hitherto have mainly caused confusion, is then the conception, not unfruitful, nor unhelpful, with which we are left by our theory of knowledge. We do not know the whole, but we know in part, and what we do know we can trust. It is reality, not seen through a glass darkly, nor—still worse—projected on some distorted plane of our own vision, but so far as it goes, and however limited it may be, true, genuine reality seen face to face: and thus

limited as is the kingdom we have as yet won for ourselves, and slow as are the steps of progress, each addition to knowledge is in sober truth one step further to the goal of all effort, the right understanding of the whole of things as they are in their inmost nature.

THE END.

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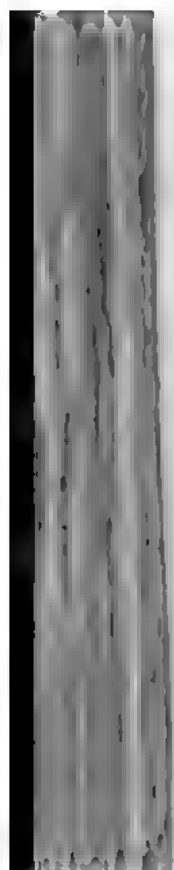
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